



Shipping and Climate Change – The International Framework

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1. The Kyoto Protocol
2. Ships and GHG-emissions
3. UNFCCC – IMO: What has happened so far
4. The challenges
5. IMO: The road ahead
6. Risks / Concerns

The Kyoto Protocol



- ❖ *Art 2.2: "Annex I Parties shall pursue limitation or reduction of emissions from greenhouse gases not controlled by the Montreal protocol from aviation and marine bunker fuels, working through ICAO and IMO "*
- ❖ *1st commitment period 2008-2012 - > 2nd period discussed in Copenhagen Dec. 2009*
- ❖ *UN Framework Convention on Climate Change (UNFCCC): maritime emissions (bunkers) are to be recorded as a separate category and not to be included under national targets (except national trade)*

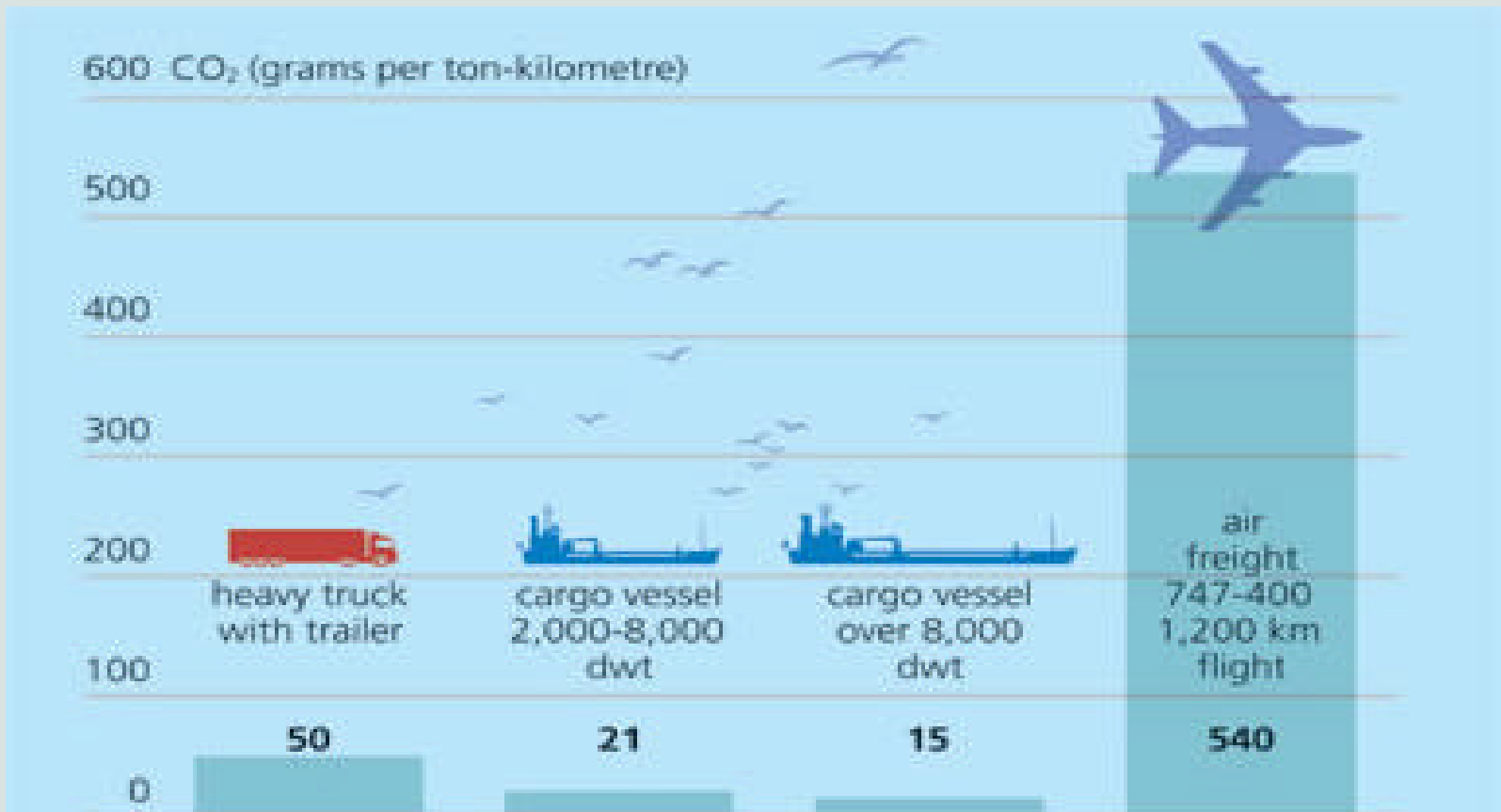


- ❖ 90%+ of world trade is carried by sea (underpinning global economy)
- ❖ 2 – 4% of global CO₂ emitted by ships
- ❖ 8 – 19% of global transport CO₂ emitted by ships
- ❖ Estimated increase of 40% CO₂ - emissions 2000 – 2020 due to increase in trade

An excellent CO₂ performance



CO₂ emissions from different transport modes



Source: Swedish Network for Transport and the Environment

What has happened so far?



- ❖ SBSTA 1996 (UNFCCC – COP): bunker allocations - > no decisions taken
- ❖ IMO:
 - ❖ Work started in 1980's
 - ❖ 1997 Marpol Annex VI (SO_x, NO_x, ODS, incinerators, ... no GHG)
 - ❖ 2000 IMO GHG study - > reduction potential
 1. Reduction of speed
 2. Improved technology
 3. Operational measures



CO₂ reduction potential by technical measures.

Measures, <u>new ships</u>	Fuel/CO ₂ saving potential	Combined ¹⁾	Total ¹⁾
Optimised hull shape	5 - 20 %	5 - 30 %	5 - 30%
Choice of propeller	5 - 10 %		
Efficiency optimised	10 - 12 % ²⁾	14 - 17 % ²⁾	
	2 - 5 % ³⁾		
Fuel (HFO to MDO)	4 - 5 %	6 - 10 % ³⁾	
Plant concepts	4 - 6 %	8 - 11 %	
Fuel (HFO to MDO)	4 - 5 %		
Machinery monitoring	0.5 - 1 %		
Measures, <u>existing ships</u>	Fuel/CO ₂ saving potential	Combined ¹⁾	Total ¹⁾
Optimal hull maintenance	3 - 5 %	4 - 8 %	4 - 20 %
Propeller maintenance	1 - 3 %		
Fuel injection	1 - 2 %	5 - 7 %	
Fuel (HFO to MDO)	4 - 5 %		
Efficiency rating	3 - 5 %	7 - 10 %	
Fuel (HFO to MDO)	4 - 5 %		
Eff. rating + TC upgrade	5 - 7 %	9 - 12 %	
(HFO to MDO)	4 - 5 %		

¹⁾ Where potential for reduction from individual measures are well documented by different sources, potential for combination of measures is based on estimates only

²⁾ State of art technique in new medium speed engines running on HFO.

³⁾ Slow speed engines when trade-of with NO_x is accepted.



CO2 reduction potential by operational measures.

Option	Fuel/CO ₂ saving potential	Combined ¹⁾	Total ¹⁾
Operational planning / Speed selection			
Fleet planning	5 - 40 %	1 - 40 %	1 - 40 %
"Just in time" routing	1 - 5 %		
Weather routing	2 - 4 %		
Miscellaneous measures		0 - 5 %	
Constant RPM	0 - 2 %		
Optimal trim	0 - 1 %		
Minimum ballast	0 - 1 %		
Optimal propeller pitch	0 - 2 %		
Optimal rudder	0 - 0.3 %		
Reduced time in port		1 - 7 %	
Optimal cargo handling	1 - 5 %		
Optimal berthing, mooring and anchoring	1 - 2 %		

¹⁾ Where potential for reduction from individual measures are documented by different sources, potential for combination of measures is based on estimates only

What has happened so far?



- ❖ A. 963(23) (2003) IMO policies and practices related to the reduction of GHG from ships (basket of 6 GHG's)
- ❖ MEPC 57 (March 2008)
 - ❖ Review of Annex VI (SO_x(PM) and NO_x) to be adopted by MEPC 58:
 - ❖ SO_x Global: 2012 (3.5%) – 2020 (0.5%) – 2018 review - > 2025
 - ❖ SO_x ECA's: 2010 (1%) – 2015 (0.1%)
 - ❖ Exhaust cleaning systems allowed
 - ❖ NO_x (also existing engines)

The New Marpol Annex VI



Emissions in 2007 and 2020

New Marpol Annex VI

Calculation assessment	Result 2007 Mill. Tonnes	Result 2020 Mill. Tonnes
Total Fuel Consumption by ships	369	486
HFO Consumption by ships	286	382
Marine Distillate consumption by ships	83	104
CO ₂ emissions from ships	1,120	1,475
CO ₂ emission reductions for a 0.5% S Marine Distillate global cap ¹	- 43	- 59
Total SO _x Emission from Ships	16.2	22.7
SO _x emission reduced by current SECAs	- 0.78	*
SO _x emission reductions for a 0.5% S Marine Distillate global cap	- 12.7	- 17.8
SO _x emission reductions in a multiple SECA environment with a 0.5% Marine Distillate SECA cap	*	-3.4
SO _x emission reductions in a multiple SECA environment with a 0.1% Marine Distillate SECA cap	*	-3.7
NO _x emissions from Ships	25.8	34.2
PM ₁₀ emissions from ships	1.8	2.4
PM ₁₀ emission reductions for a 0.5% S Marine Distillate global cap	- 1.5	- 2.0

Total Fuel consumption
+30% !

CO₂-4%

SO_x-78%

PM₁₀-83%

Refining process?
60 – 90 Mton

Source: MEPC 57/4: Report on the outcome of the **Informal Cross Government/Industry Scientific Group of Experts** established to evaluate the effects of the different fuel options proposed under the revision of MARPOL Annex VI



❖ MEPC 57 continued

- ❖ Sec. Gen.: “ ... *IMO should show leadership, not only by moving in parallel, but also keeping one step ahead of the agreed UNFCCC process ...*”
- ❖ Update 2000 IMO GHG study
- ❖ Future IMO Framework/principles
- ❖ Correspondence group on GHG (NED-AUS)
- ❖ Intersessional (June 2008 Oslo)

Challenges / stumbling blocks



1. Parties hesitant to restrict themselves in their national sovereignty in GHG Policy (Subsidiarity - > common goal but national climate change policies)
2. Debate on allocation of responsibility has paralyzed the discussion on which measures to take (bunkers - > international inventory? - > common action)
3. The UNFCCC regime's Rio principle "common but differentiated responsibility" conflicts with IMO standard PSC regime
4. Maritime transport emissions are considered to contribute in a minor way to total CO₂ emissions and have a relatively lower contribution compared to other modes of



❖ Update 2000 IMO GHG study

Phase 1: update inventory and future emission scenarios, will be reported to IMO by the 1st of September 2008 for consideration by MEPC 58 in October 2008; and

Phase 2: also covering greenhouse gases other than CO₂, as well as the identification and consideration of future reduction potentials by technical, operational and market-based measures, will be submitted to IMO by February 2009 for consideration



❖ Future IMO Framework/principles:

1. **effective** in contributing to the reduction of total global GHG emissions;
2. **binding** and equally applicable **to all flag States** (Ships??) in order to avoid evasion;
3. cost-effective (**no regret**);
4. able to limit, or at least, effectively minimize **competitive distortion**;
5. based on sustainable environmental development without penalizing **global trade and growth**;
6. based on a **goal-based approach** and not prescribe specific methods;
7. supportive of promoting and facilitating **technical innovation** and R&D in the entire shipping sector;
8. accommodating to leading technologies in the field of energy efficiency; and
9. practical, transparent, fraud free and easy to administer.



- ❖ Correspondence group on GHG (NED-AUS)
 1. prepare detailed proposals on the measures identified in the Correspondence Group report (MEPC 57/4/5; MEPC 57/4/5/Add.1), which have not been identified for further consideration by the GHG Working Group at its intersessional meeting in Oslo (23-27 June 2008); and
 2. present an interim report to MEPC 58 with a final report to be presented to MEPC 59"



❖ Intersessional (June 2008 Oslo)

1. Develop a range of measures that will form part of a future GHG-regime:
 1. CO₂ Design Index for new ships and;
 2. CO₂ operational index for all ships;
 3. Methodology for CO₂ efficiency baselines;
 4. global levy/hybrid mechanism;
 5. Emissions Trading Schemes (ETS) and/or Clean Development Mechanism (CDM); and
2. Will also consider
 1. Best practices;
 2. Level of reduction;
 3. Regulatory and legal aspects



- ❖ Technical short term:
 - ❖ Improvement of specific fuel consumption
 - ❖ Energy efficiency design
 - ❖ Onshore power supply
 - ❖ Use of wind power
- ❖ Operational short term
 - ❖ Energy management plan
 - ❖ Reporting CO₂ index
 - ❖ Vessel speed reduction
 - ❖ Improved traffic control, fleet management, cargo operations
- ❖ Market-based short term
 - ❖ Charge-cap-and-trade / charge on all fuel
 - ❖ Voluntary commitments



- ❖ Technical longer-term:
 - ❖ Technical measures for ship design
 - ❖ Use of alternative fuels
 - ❖ A mandatory CO₂-design index for new ships
- ❖ Operational longer-term
 - ❖ External verification scheme for CO₂ index
 - ❖ Unitary CO₂ index limit + penalties
- ❖ Market-based longer-term
 - ❖ ETS
 - ❖ Inclusion of mandatory CO₂ port infrastructure charging



- ❖ Regional actions -> The role of IMO is essential
 - ❖ Global approach will be effective (>80% flagged with non-Annex I parties)
 - ❖ No more favorable treatment
 - ❖ Distortion of competition (flagging out)
- ❖ Modal Backshift
 - ❖ Intercontinental shipping: no real competition of other transport modes
 - ❖ SSS -> in competition with other transport modes (especially road transport) – especially in the EU
 - ❖ Modal backshift from shipping to road transport would mean a substantial increase of Total CO2 emissions: *"Shipping is not the problem but part of the solution!"* -> **holistic overview**