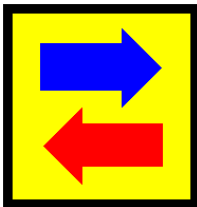


# IENE "Energy and shipping": introductory remarks



Harilaos N. Psaraftis

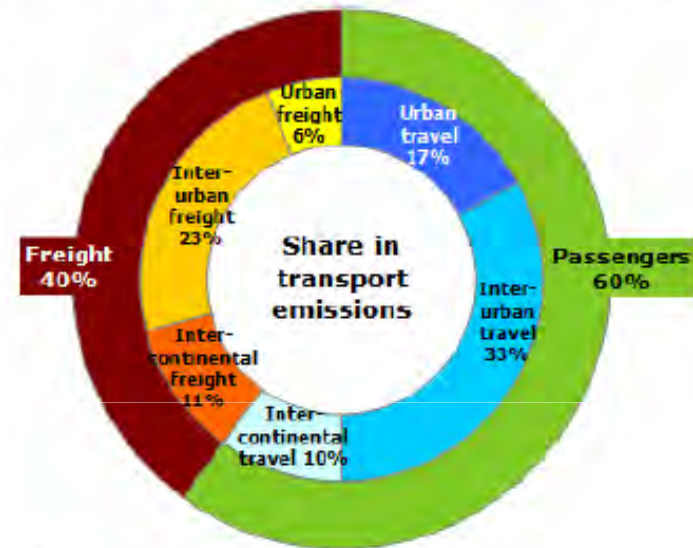
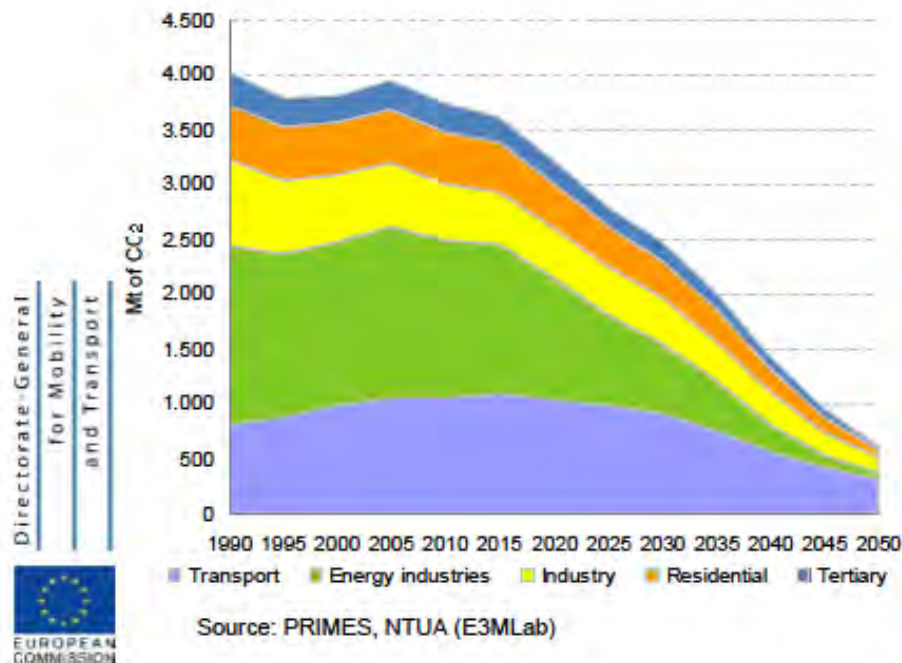
Laboratory for Maritime Transport  
School of Naval Architecture and Marine Engineering  
National Technical University of Athens  
Greece

# Perspective

- Take an brief look at what emerges as one of the main challenges of shipping
- Main challenge: a ship has to be both profitable and energy-efficient
- Main focus: emissions
- Is 'win-win' possible?

## ● A tight carbon budget for the transport sector

- In October 2009, the European Council showed support for the objective of reducing GHG emissions in the EU by 80 to 95% by 2050 compared to 1990 levels



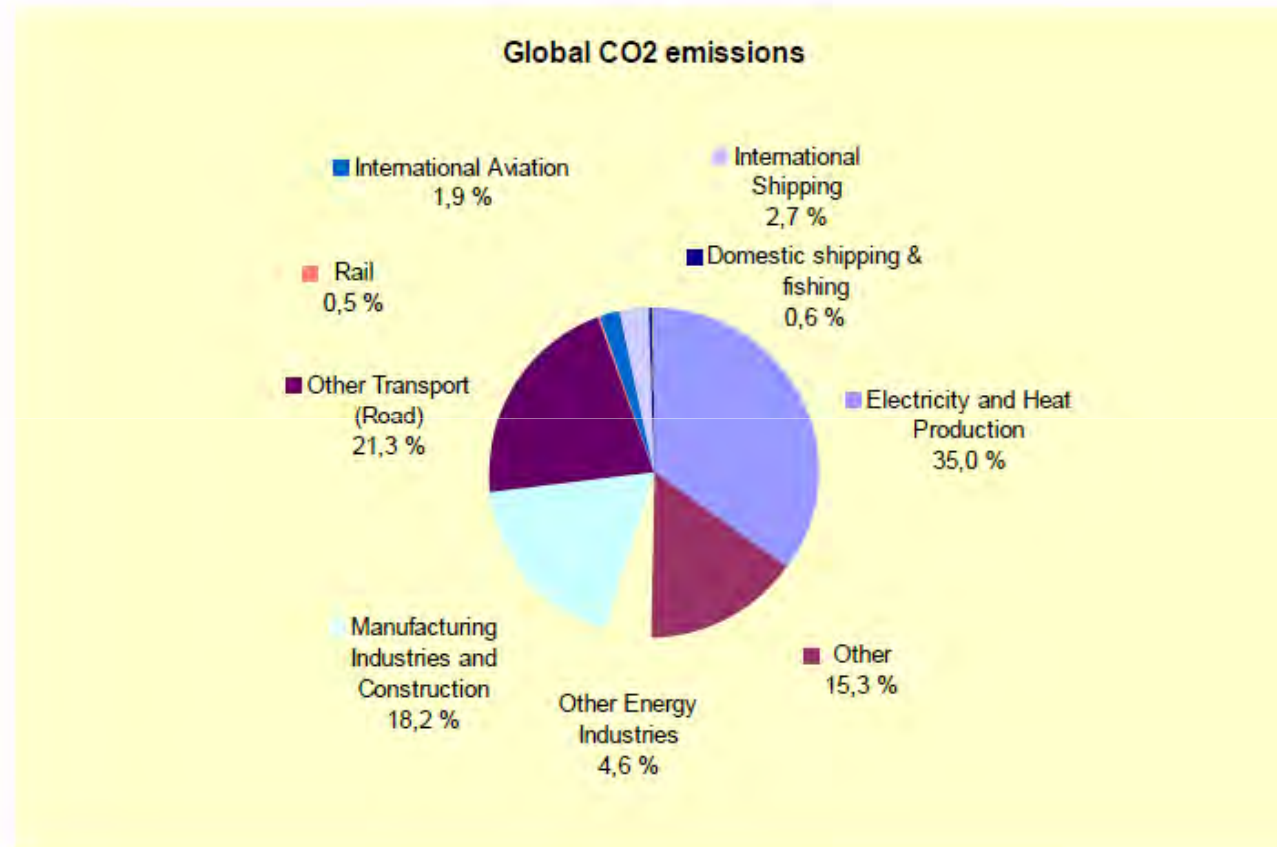
Source: PRIMES-TREMOVE and TREMOVE

- Transport accounts for about one fourth of GHG emissions: 60% comes from passenger transport, one quarter is urban, less than one quarter is inter-continental and over half is medium-distance

# 2011 White Paper

- Sets a goal of reducing GHG emissions from transport (all modes) by 60% by 2050
- IMO has equally ambitious goals to reduce EEDI by 30% by 2030
- Main challenge: how can international shipping grow and be profitable in the face of such ambitious environmental goals

# Share of global CO<sub>2</sub> emissions



Emissions of CO<sub>2</sub> from shipping compared with global total emissions for 2007  
(Source: Second IMO GHG Study 2009)

# Comparison among modes

(source: IMO GHG study 2009)

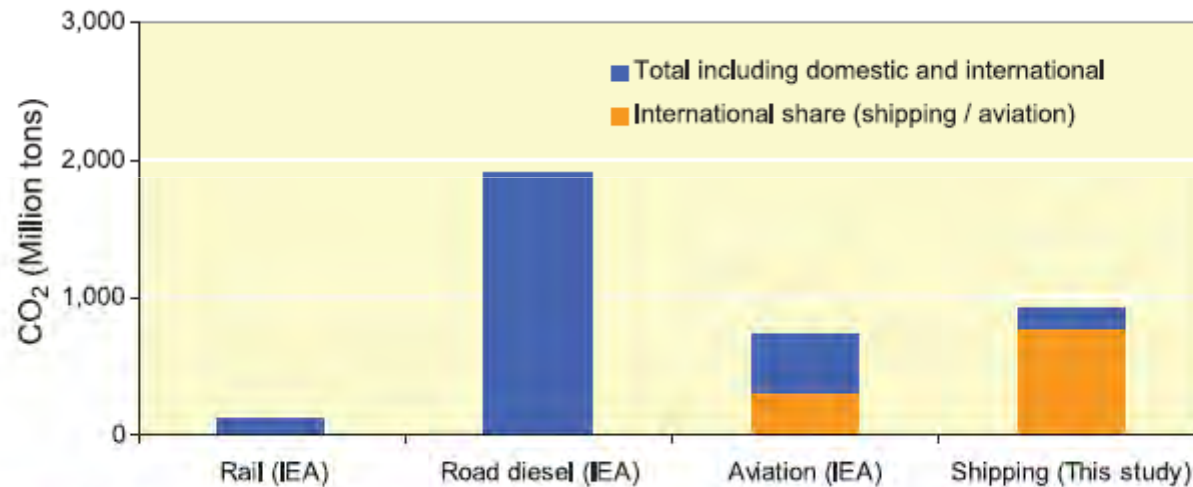


Figure 9.6 Emissions of CO<sub>2</sub> in 2005 from shipping compared to other transport modes

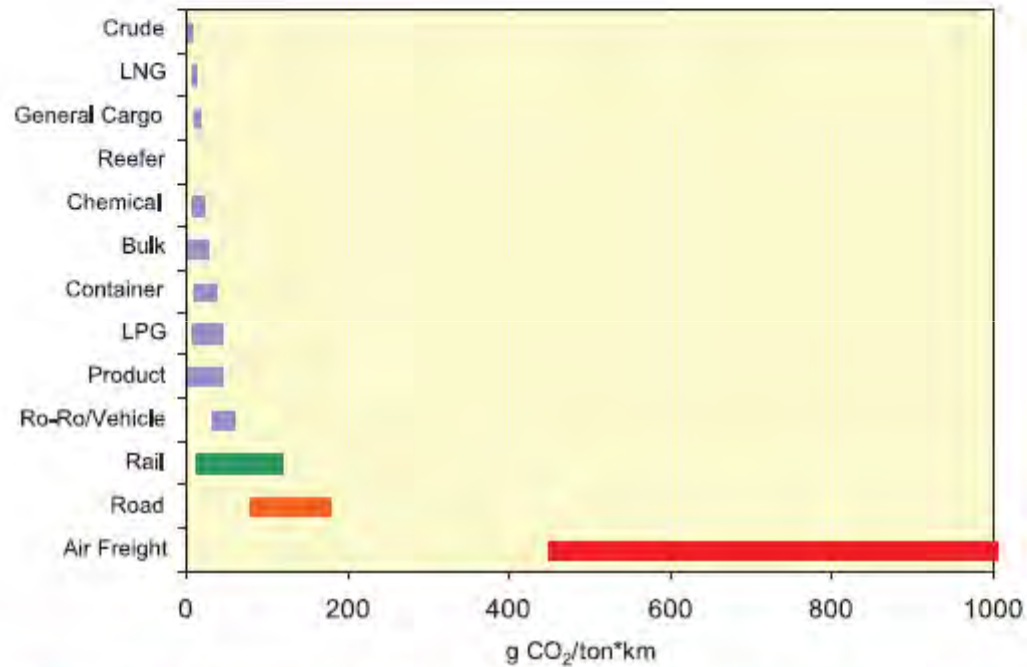
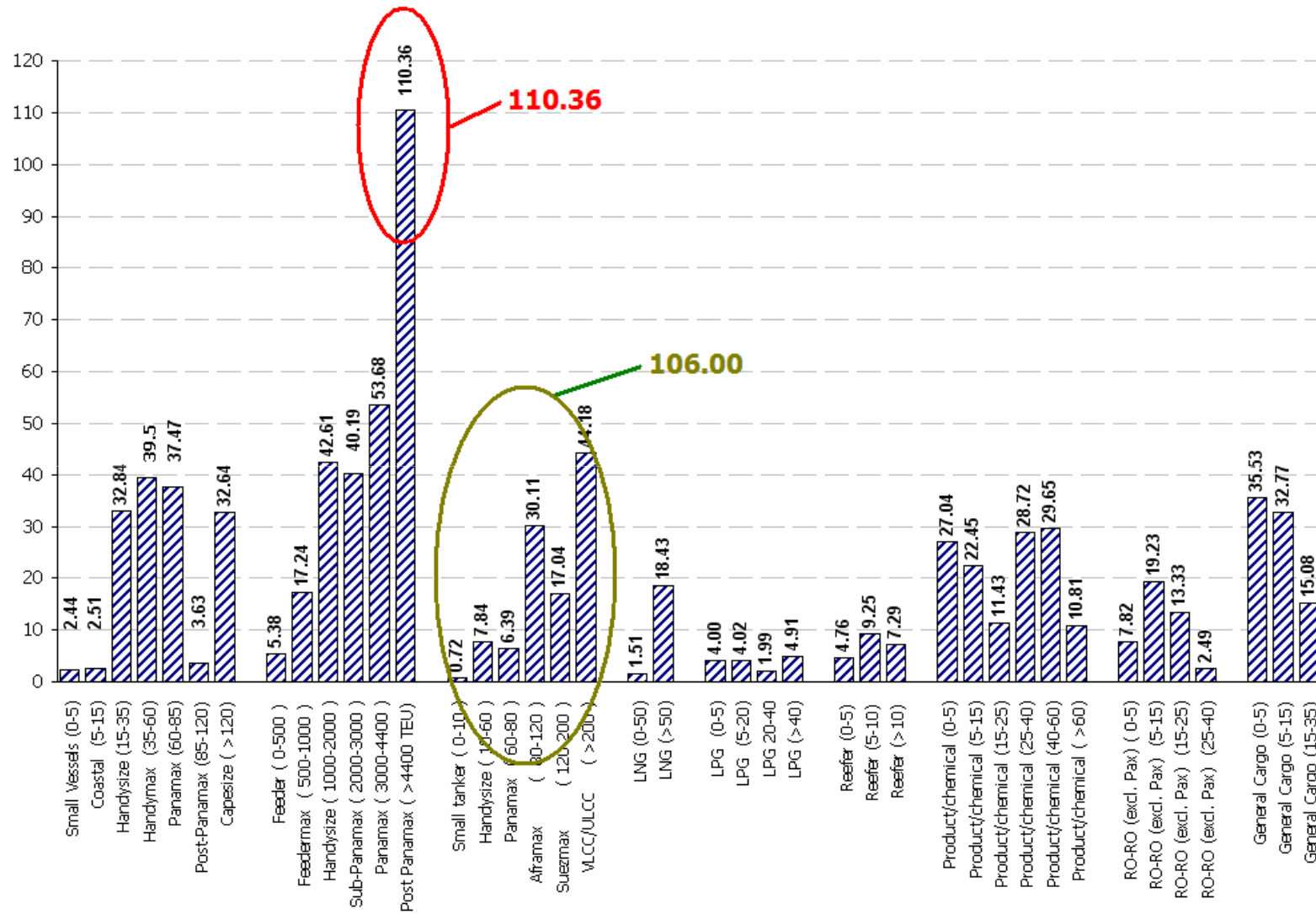


Figure 9.3 Typical range of ship CO<sub>2</sub> efficiencies compared to rail, road and air freight

## CO2 emissions per vessel category (million tonnes)



\*Psarftis, H.N. and C.A. Kontovas (2009), "CO2 Emissions Statistics for the World Commercial Fleet", WMU Journal of Maritime Affairs, 8:1, pp. 1-25.



# Shipping under pressure

**BETA**

**SHIPPINGEFFICIENCY.ORG**  
Information for a more efficient market

- HOME
- ABOUT US
- METHODOLOGY
- WHO SHOULD USE US
- GET INVOLVED
- LATEST NEWS
- SUPPORT
- CONTACT US
- TERMS OF USE

Sir Richard Branson, Founder CWR; José María Figueres, Chairman, CWR; Nils Andersen, CEO, AP Moller-Maersk, and Arild Iversen, CEO, Wallenius Wilhelmsen Logistics attending a joint CWR/AP Moller-Maersk event to promote marine environment technology innovation.

Vessel Energy Efficiency Rating **GO** Container CO<sub>2</sub> Rating **GO**

Shippingefficiency.org is a free-access, beta data-hub designed for ship owners, operators, charterers, ports, insurance companies, shipbrokers and other stakeholders, to factor in vessel efficiency information when making business decisions.

Shippingefficiency.org assesses and provides energy efficiency ratings energy efficiency for over 60,000 international vessels based on the United Nations' IMO's Energy Efficiency design Index (EEDI). A separate search tool provides ratings

6 1 6 4 1 9 2 6 2

Using efficiency measures available now, this could be the amount of CO<sub>2</sub> emitted a year. [Learn more.](#)

8 2 1 8 9 0 9 8 8

Instead, this is closer to the figure that's actually being emitted a year within the shipping industry. [Learn more.](#)

**Emissions Calculator**

Fuel Type: IFO

Volume (metric tonnes): 500

Sulphur (%): 4.5

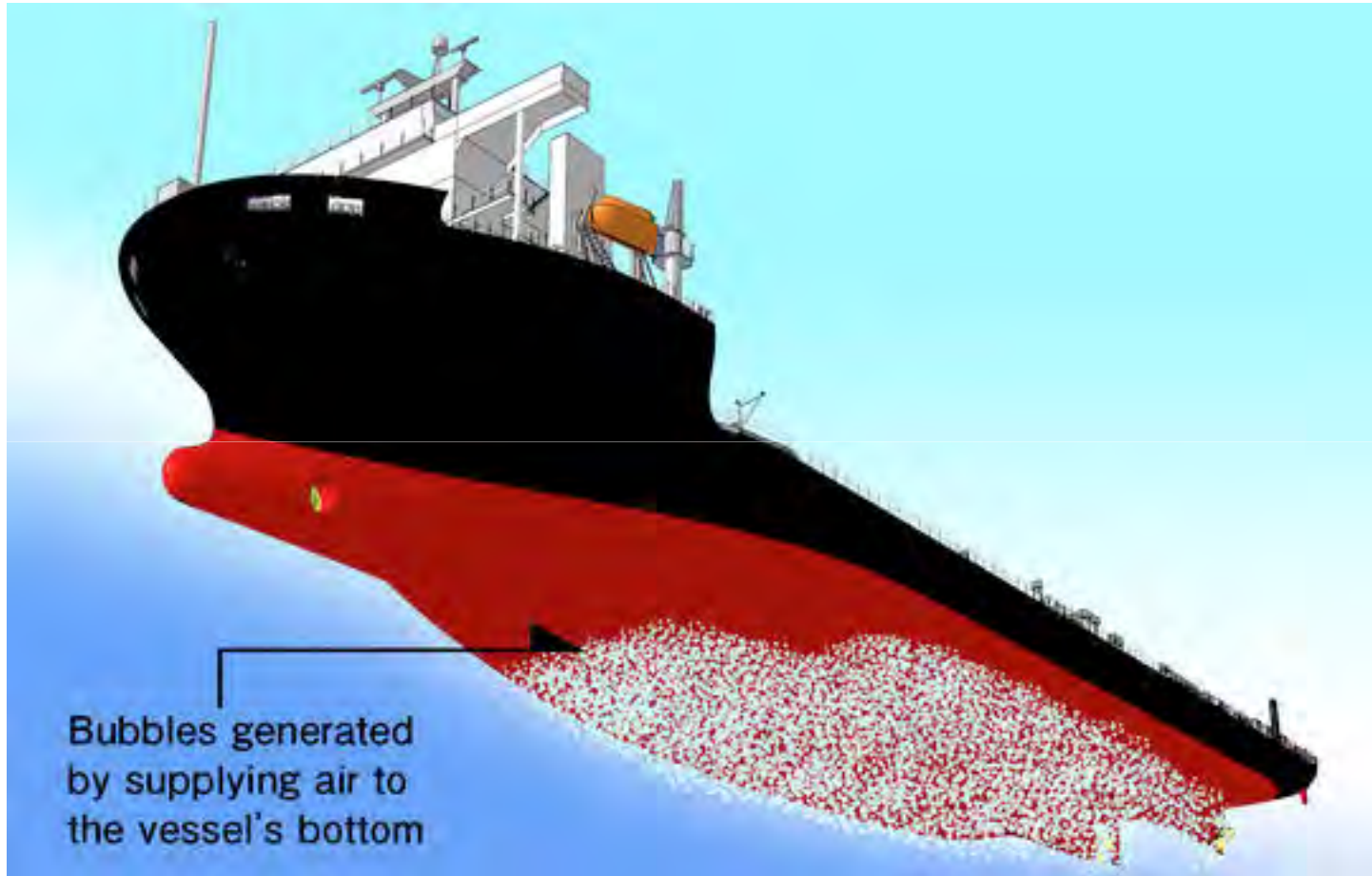
**CALCULATE NOW**

**Your Emissions**

# Measures contemplated

- Technological
  - More efficient (energy-saving) engines and propulsion
  - More efficient vehicle designs
  - Cleaner fuels (low sulphur content)
  - Alternative fuels (fuel cells, biofuels, etc)
  - Devices to trap exhaust emissions (scrubbers, etc)
  - Energy recuperation devices
  - “Cold ironing” in ports
- Market-based instruments
  - Emissions Trading Scheme (ETS)
  - Carbon Tax/Levy on Fuel
  - Others
- Logistics-based
  - Speed reduction
  - Optimized routing
  - Others





# Major development

- Adoption of EEDI at IMO (MEPC 62) last July
- First time that GHGs for ships become regulated

# What is EEDI?

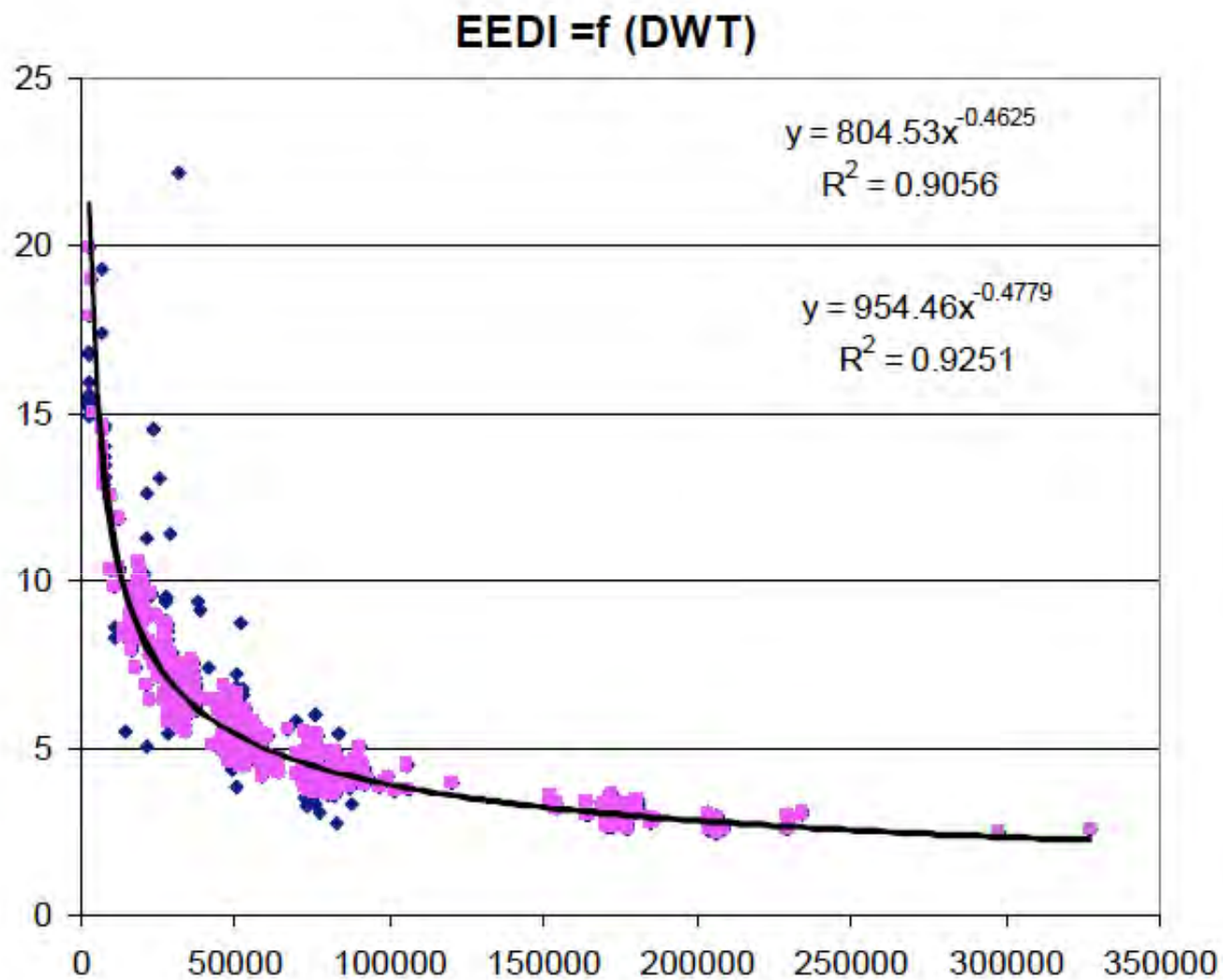
- Energy Efficiency Design Index (EEDI)

$$\frac{\left( \prod_{j=1}^M f_j \left( \sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)} \right) + (P_{AE} \cdot C_{FAE} \cdot SFC_{AE}^*) + \left( \left( \prod_{j=1}^M f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AE_{eff(i)}} \right) C_{FAE} \cdot SFC_{AE} \right) - \left( \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME} \right) \right)}{f_i \cdot Capacity \cdot V_{ref} \cdot f_w}$$

- Ratio of installed power divided by (capacity\* speed) [gr CO2/ton-mile]

# EEDI: adopted in July 2011

- Mandatory for newbuildings
- Will have to have:  $EEDI \leq \text{Reference line EEDI}$
- Reference line EEDI = f (ship type, DWT)
- Reference line EEDI more stringent in future years
- Reduction of up to 30% by 2030



**Figure 1: Dry bulk carriers**  
**All data: 2,259 ships. Without outliers (shown in blue  $\blacklozenge$ ): 2,218 ships**



# Concerns

- Meeting the requirement is tantamount to a speed limit (or, a limit on installed MCR)
- Speed reduction via EEDI is an “easy” solution that shifts the focus away from designing the best hull forms, engines or propellers, to just reducing speed.
- This could lead to **underpowered ships**, with negative implications on safety and manoeuvrability
- CO2 reductions marginal or even negative as smaller engine ships may emit more CO2 to maintain speed in bad weather

# Market Based Measures

- 11 MBM proposals at MEPC 60 (March 2010)
- Expert Group formed by Sec. General
- Feasibility study
- Work: May- August 2010
- Various discussions, but
- **NO DECISION YET**

# MBM proposal groups

- International GHG Fund (Denmark et al) (LEVY)
- Emissions Trading Schemes (Norway, UK, France, Germany)
  
- Various hybrids, based on EEDI (Japan, USA, WSC)
- Port-based (Jamaica)
- Rebate mechanism (IUCN)
- Bahamas proposal

# Greece's position

- Has not submitted an MBM proposal
- If an MBM is adopted, is for LEVY
- Has submitted a comprehensive comparison of all MBM proposals
- Has submitted a proposal on how to move on

# Greece's proposal to IMO

- Keep on table only Levy and ETS proposals
- Put on hold hybrid MBMs (US, Jap., WSC)
- Discard all others (Bahamas, Jamaica, IUCN)

# Greece's proposal to IMO

- Keep on table only Levy and ETS proposals
- Put on hold (IMO, MEPC, Jap., WSC)
- Discard all other (Jamaica, IUCN)
- **KEEP ALL ON THE TABLE**

# Further IMO work on MBMs

- MEPC 62, July 2011: No time (EEDI)
- MEPC 63: 27 Feb.- 2 March 2012
- "Impact study" of MBMs (to be completed by MEPC 65 - 2013).

# Enter European Commission!

- Has supported IMO process, BUT:
- Has stated very clearly that if IMO drags its feet, EU will proceed on its own
- Specifically, if no decision by EU-27 by Dec. 31, 2011, Commission will develop its own proposals
- IMO decision on EEDI: not enough





# What will the EU propose?

- Rumor: ETS (like in airlines)
- Officially: all options open
- Several studies under way
- Some stakeholders are against **regional** measures



The screenshot shows the European Commission Climate Action website. The header includes the European Commission logo and the text "Climate Action". Below the header, there is a navigation menu with "About us", "Policies", "News", and "Contracts & Grants". The main content area is titled "European Climate Change Programme" and features a sub-menu with "Policy", "Documentation", "Studies", and "Links". The main text states: "The European Union has long been committed to international efforts to tackle climate change and felt the duty to set an example through robust policy-making at home. At European level a comprehensive package of policy measures to reduce greenhouse gas emissions has been initiated through the European Climate Change Programme (ECCP). Each of the EU Member States has also put in place its own domestic actions that build on the ECCP measures or complement them." Below this text, there is a section titled "The European Commission has taken many climate-related initiatives since 1991, when it joined the..."

# My opinion

- Shipping will be facing many challenges in the years ahead
- Dual goal of profitable + energy-efficient shipping is one of these challenges
- Win-win strategies must be pursued
- Need a holistic approach so as to avoid undesirable results

# Have a nice conference!

- [www.martrans.org](http://www.martrans.org)

