Multi-year Expert Meeting on Transport, Trade Logistics and Trade Facilitation

Sustainable Freight Transport Systems: Opportunities for Developing Countries

14-16 October 2015

SUSTAINABLE TRANSPORTATION: SOME POLICY CHALLENGES

by

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14 October 2015

Sustainable transportation: some policy challenges

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Purpose

- Address some challenges in sustainable transportation and what policy makers are doing to tackle them

Remarks:

- Non – encyclopedic
- Mostly (but not exclusively) EU
- Mostly (but not exclusively) maritime

What is sustainable (green) transportation?

- An attempt to attain an acceptable environmental performance of the intermodal transportation supply chain, while at the same time respecting traditional economic performance criteria.

- 'win-win' solutions are sought

Primary focus

- “Acceptable environmental performance”: what does it mean?

- “Acceptable level of **emissions**”

- [NOTE: there are certainly additional environmental attributes of transport that create external costs, such as accidents, noise, hazardous substances, oil spills, ballast water, residues, garbage, etc]

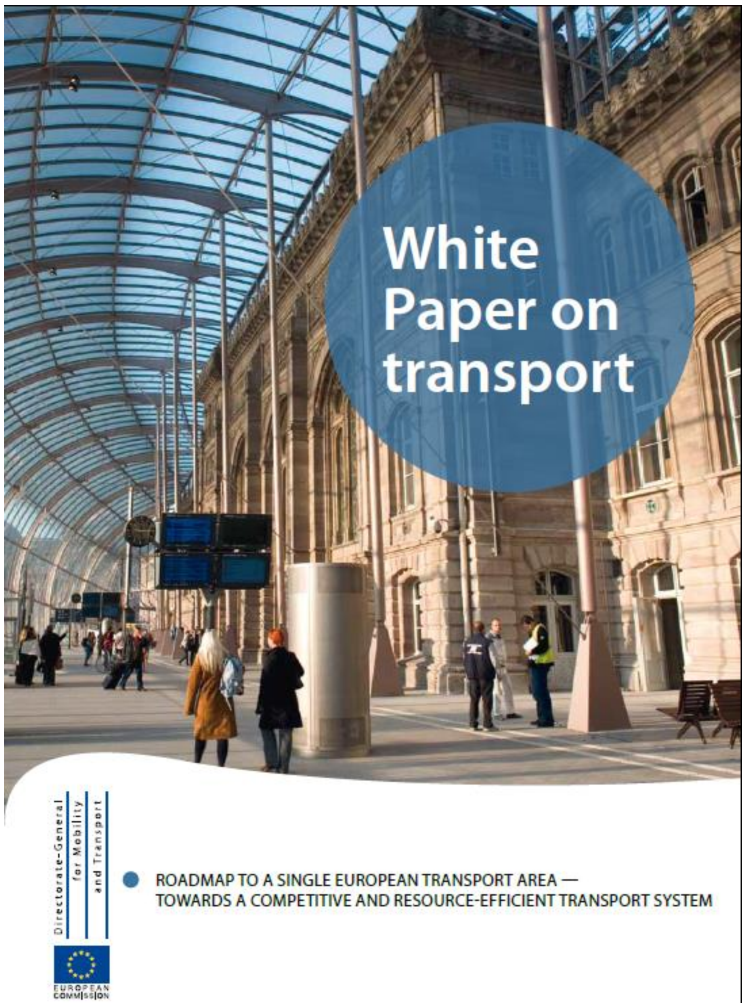
2011 EU Transport White Paper

One vision (for 2050)

Transport has to:

- use less energy
- use cleaner energy
- exploit efficiently a multimodal, integrated and intelligent network

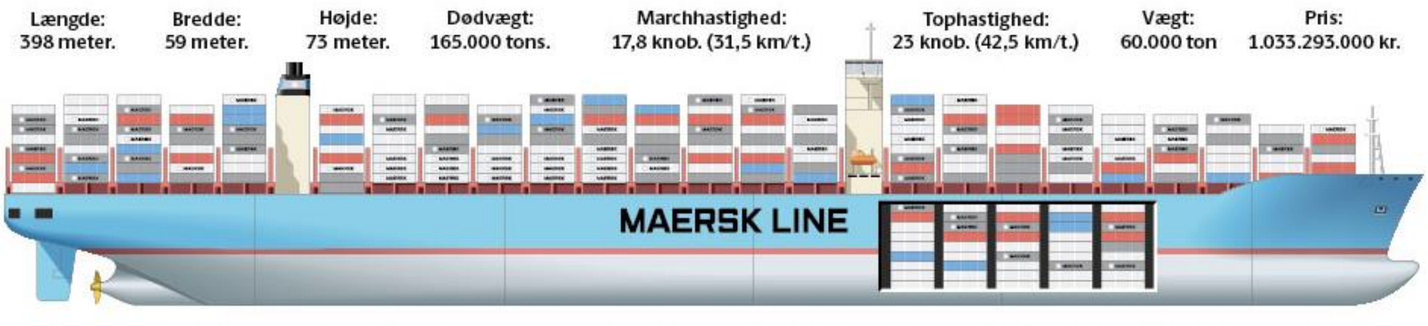
2011 EU Transport White Paper

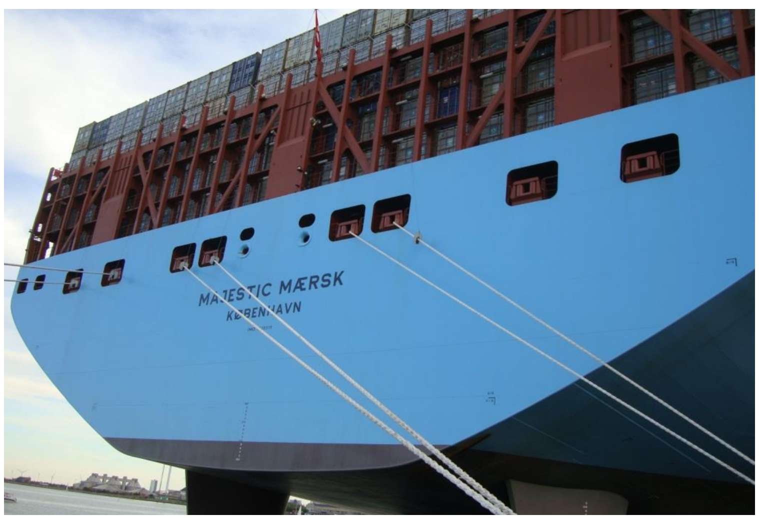


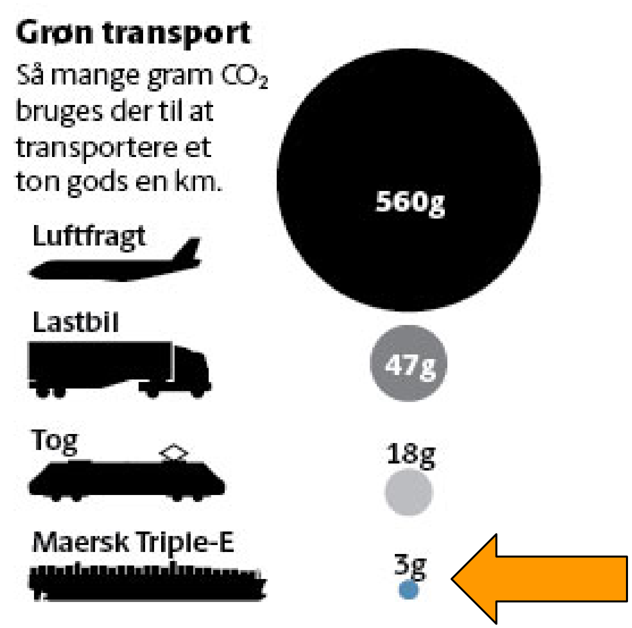
(among other things)

- GOAL: reduce GHG emissions from transport (all modes) by 60% by 2050, vis-à-vis 1990 levels.
- Main challenge: how can international transport grow and be profitable in the face of such an ambitious goal

Mærsk Triple E ships







2011 EU Transport White Paper

Ten benchmarks

New and sustainable fuels and propulsion systems

1. Halve the use of 'conventionally-fuelled' cars in urban transport by 2030; phase them out in cities by 2050; achieve essentially CO_2-free city logistics by 2030.

2. 40% low-carbon sustainable fuels in aviation and 40% (if feasible 50%) less emissions in maritime by 2050.

2011 EU Transport White Paper

Optimising the performance of multimodal logistic chains, including by making greater use of more energy-efficient modes

3. 30% of road freight over 300 km should shift to other modes by 2030, and more than 50% by 2050.
4. Triple the length of the existing high-speed rail network. By 2050 the majority of medium-distance passenger transport should go by rail.
5. A fully functional and EU-wide multimodal TEN-T ‘core network’ by 2030.
6. By 2050, connect all core network airports to the rail network; all seaports to the rail freight and, where possible, inland waterway system.

2011 EU Transport White Paper

Increasing the efficiency of transport and of infrastructure use with information systems and market-based incentives

7. Deployment of SESAR (Single European Sky ATM Research) by 2020 and completion of the European Common Aviation Area. Deployment of ERTMS, VTS, ITS, SSN and LRI, RIS and Galileo.
8. By 2020, establish the framework for a European multimodal transport information, management and payment system.
9. By 2050, move close to zero fatalities in road transport.
10. Move towards full application of "user pays" and "polluter pays" principles.

The new TEN-T policy (2013)

"Regulation (EU) No 1315/2013 of the European Parliament and of the Council on Union guidelines for the development of the Trans-European Transport Network and repealing Decision No 661/2010/EU" **(11 December 2013)**

Obstacles addressed

- missing links, in particular at cross-border sections;
- disparity in quality and availability of infrastructure (bottlenecks);
- fragmented transport infrastructure between transport modes;
- significant investments in transport infrastructure needed in order to achieve the GHG emission reduction target; and
- interoperability problems due to different operational rules and requirements by the Member States.

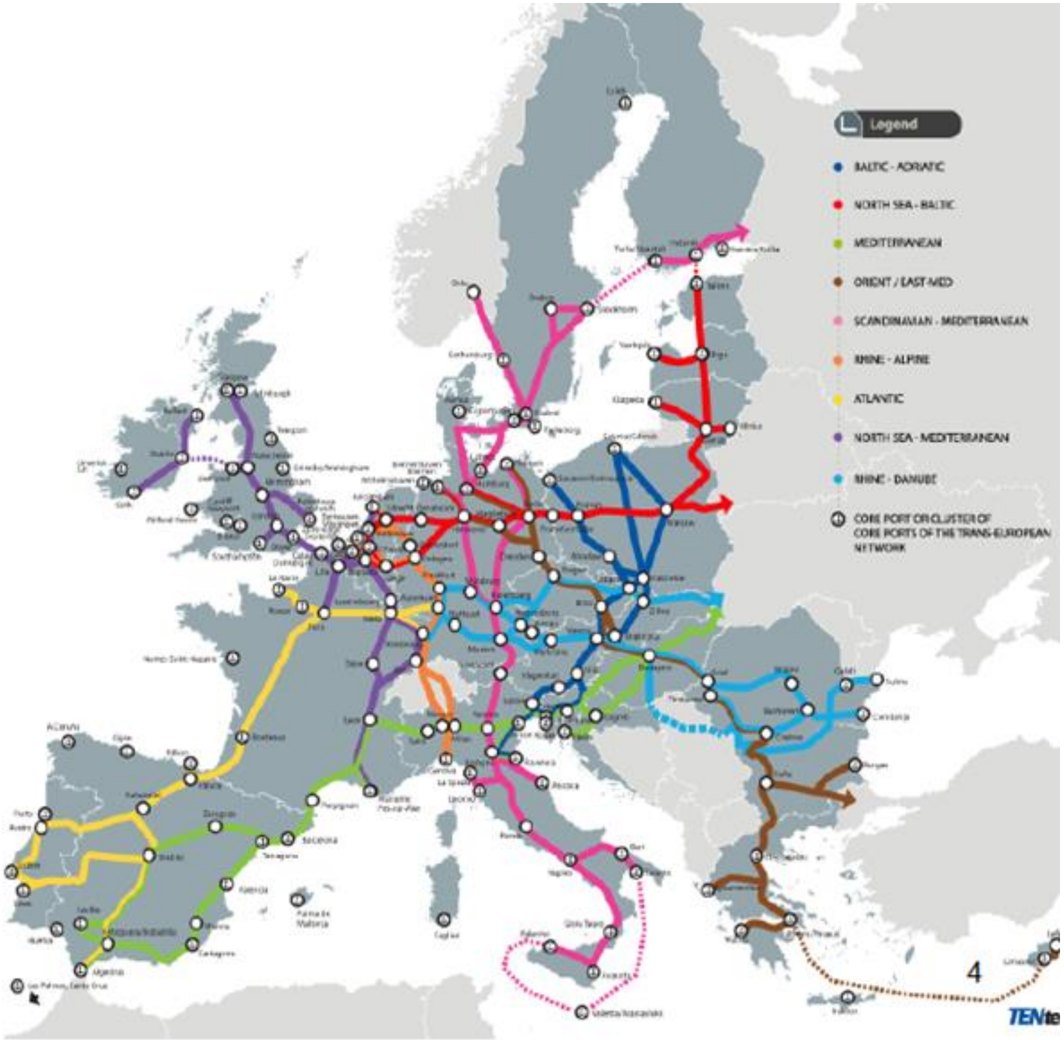
The new TEN-T policy (2013)

The dual-layer approach

- *Comprehensive network*
  - directly reflects the relevant existing and planned infrastructure in Member States
  - involves updating and adjustment of the current TEN-T (accessibility for citizens and economic operators and broad base for an efficient, safe and sustainable transport system)

- *Core network*
  - overlays the comprehensive network
  - consists of its strategically most important parts
  - constitutes the backbone of the multimodal mobility network
  - concentrates on those components of TEN-T with the highest European added value: cross border missing links, key bottlenecks and multimodal nodes

TEN-T core network corridors



The ERTMS corridors

European Rail Traffic Management System (ERTMS)

Serious interoperability problems in rail transport:

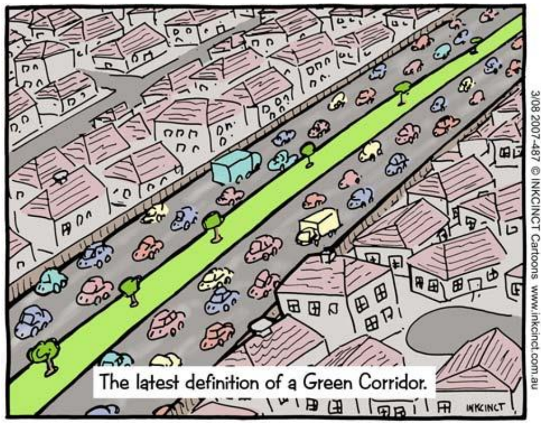
- More than 20 signalling systems in Europe
- Trains need to be equipped with several on-board systems to cross borders
- Drivers need to be trained to use these systems
- Sometimes even trains have to be changed at the border

In 2009, six priority corridors for the deployment of ERTMS (by 2020) were established:

- Corridor A: Rotterdam-Genoa
- Corridor B: Stockholm-Naples
- Corridor C: Antwerp-Basel
- Corridor D: Budapest-Valencia
- Corridor E: Dresden-Constanta
- Corridor F: Aachen-Terespol

“Green” transport corridors for freight

- **Freight Transport Logistics Action Plan (2007)**



- **concentration of freight traffic** between major hubs and by relatively long distances
- reliance on **co-modality** and on **advanced technology** in order to accommodate rising traffic volumes, while promoting environmental sustainability and energy efficiency
- equipped with **adequate transhipment facilities** at strategic locations
- equipped with supply points for bio-fuels and other forms of **green propulsion**
- used to **experiment with environmentally-friendly, innovative transport units**, and with advanced ITS applications
- **fair and non-discriminatory access** to corridors and transhipment facilities

Project SuperGreen (EU FP7)

GREEN CORRIDOR KPIs

• Relative transport cost (to the user)	€/ton-km
• Transport time (or speed)	hours (or km/h)
• Reliability (on-time delivery)	% of shipments
• Frequency of service	number per year
• CO_2-eq emissions	g/ton-km
• SOx emissions	g/ton-km

Green corridors vs. core network corridors: are the TEN-T core network corridors green?

TEN-T green characteristics

- Reliance on co-modality
  - ✓ adequate transhipment facilities
  - ✓ integrated logistics concepts
- Reliance on advanced technology
  - ✓ energy efficiency
  - ✓ use of alternative clean fuels
- Development/demonstration of environmentally-friendly and innovative transport solutions, including ICT applications
- Collaborative business models

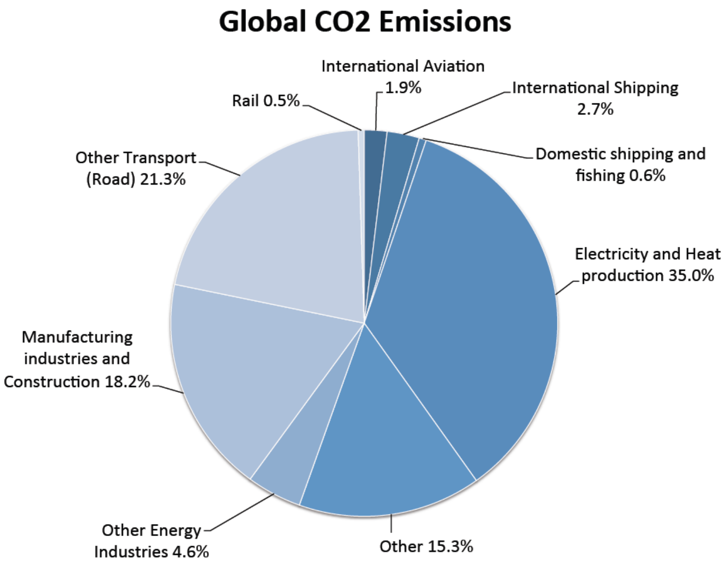
Green corridors vs. core network corridors

- All characteristics that make a corridor green are more or less met by the proposed concept of TEN-T core network corridor

- **The vision of having a network of green corridors in Europe is closer to becoming a reality**

Maritime transport

2009 IMO GHG study
- (2007 data)



2014 IMO GHG study
- (2012 data)

- 2.7% reduced to 2.2%
- 796 million tonnes of CO_2 in 2012, down from 885 million tonnes in 2007
- Mainly attributed to **slow steaming** due to depressed market conditions after 2008

EEDI (IMO, 2011)

Energy Efficiency Design Index (EEDI) definition

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

EEDI functionality

- Mandatory for all new commercial ships > 400 GRT
- 2013 start date
- All new ships will have to have: EEDI ≤ EEDI ref. line

EEDI (IMO, 2011)

- EEDI ref. line = f(ship type, DWT) = $a(DWT)^{-c}$

Ship type	a	c
Bulk carrier	961.79	0.477
Gas carrier	1120.00	0.456
Tanker	1218.80	0.488
Container ship	174.22	0.201
General cargo ship	107.48	0.216
Reefer	227.01	0.244
Combination carrier	1219.0	0.488

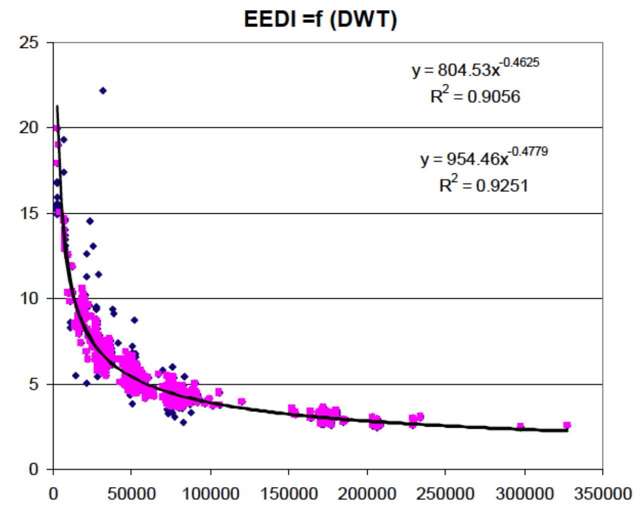


Figure 1: Dry bulk carriers
All data: 2,259 ships. Without outliers (shown in blue ◆): 2,218 ships

EEDI (IMO, 2011)

EEDI functionality (continued)

- EEDI ref. line more stringent in future years

Required EEDI = $(1-X/100)*a*DWT^{-c}$

X is a 'reduction factor' specified by the IMO as follows:

X=0% for ships built from 2013-2015
X=10% for ships built from 2016-2020
X=20% for ships built from 2020-2025
X=30% for ships built from 2025-2030

Concerns

- To reach required EEDI, **the correct solution** would be to **optimize hull, engine and propeller**
- **The easy solution** would be to **reduce installed power**
- This could lead to **underpowered ships**

- **Current IMO discussion: how to reconcile EEDI compliance with minimum safe power**

Market Based Measures (MBMs)

- 11 MBM proposals at MEPC 60 (2010)
- Expert Group formed by IMO Sec. General
- 300-page report (2010)
- Various discussions 2010 to 2013
- Process suspended at MEPC 63 (2013)
- Discussion relayed to MRV

Monitoring, Reporting and Verification (MRV)

- 2 parallel approaches: IMO and EU
- Approaches have some differences!
- Biggest difference: reporting of cargo information
  - IMO: not necessary
  - EU: mandatory

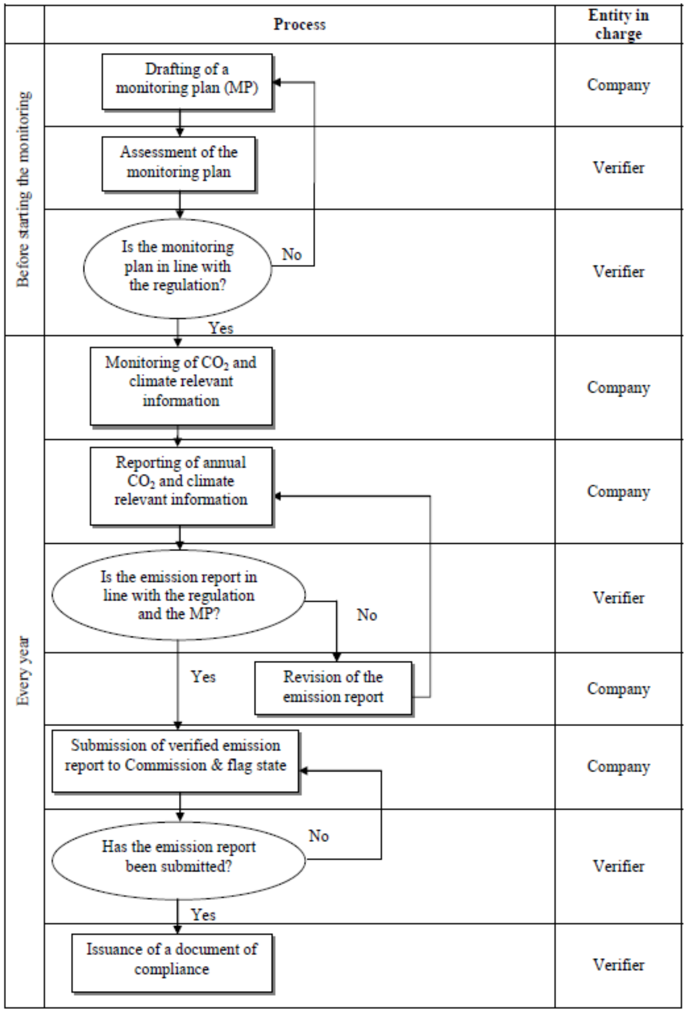
The MRV EU Regulation: Basics

- ➢ Proposed by the EC in June 2013
- ➢ Adopted as **Regulation (EU) 2015/757** in April 2015
- ➢ Objectives:
- Produce accurate information on the CO_2 emissions of large ships using EU ports
- Incentivise energy efficiency improvements by making this information publicly available
- Secure more time to discuss emission reduction targets and relevant measures in IMO

The MRV EU Regulation: Provisions

- Emission monitoring plan is prepared (C) and approved (V)
- For each ship and journey, information is collected (C) on:
  - fuel consumption
  - distance travelled
  - time at sea
  - cargo carried
- Annual report is produced (C) and approved (V) containing energy efficiency and emissions indicators
- Report submitted to flag state & EC (C)
- Conformity document issued (V)
- Conformity checked by flag & port state
- EC publishes ship performance data

C=Company; V=Verifier



The MRV EU Regulation: Critique

Too mild

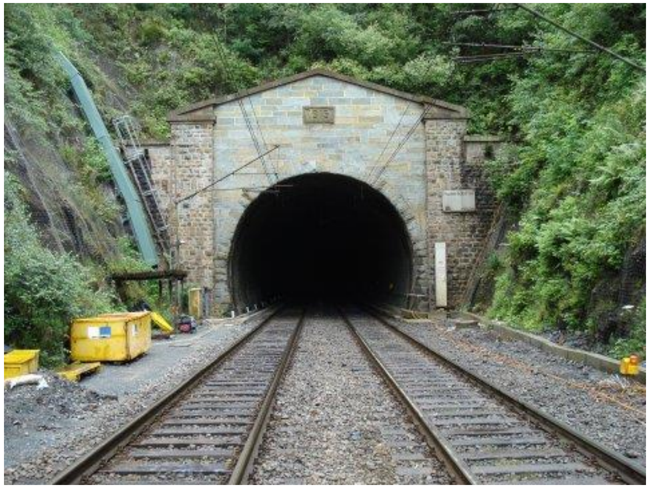
- Only monitors; does not impose reduction
- Does not cover other pollutants like SOx and NOx
- Monitoring fuel consumption on the basis of Bunker Delivery Notes and fuel tank soundings is unreliable
- More disaggregated reporting is needed allowing publication of data on a route basis

Too harsh

- IMO is the natural regulator of international shipping; a regional regulation might complicate discussions taking place at IMO
- The use of ‘transport work’ as a measure of operational efficiency is questionable
- IMO has found EEOI and similar indicators inappropriate for comparing the operational efficiency of different ships

MRV Claims

- The European Commission claims that MRV will reduce maritime GHG emissions by 2% by 2030.
- This claim is (by and large) unsubstantiated.
- At the end of the tunnel: MBMs

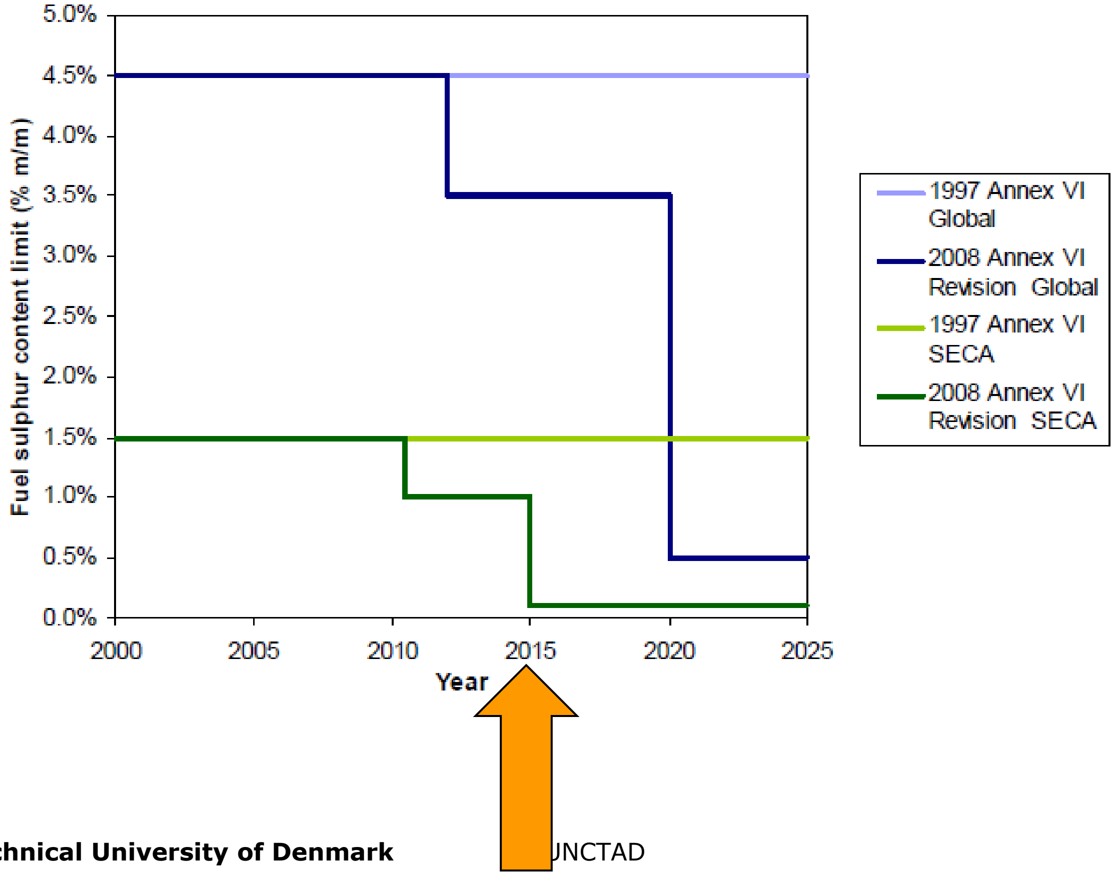


The SOx/NOx track

MEASURES

- Low-S fuels (SOx)
- Emissions control areas or ECAs (Baltic, North Sea, Channel, North America)
- Tier III engines (NOx)

SOx and IMO MARPOL Annex VI



SOx and IMO MARPOL Annex VI

EU Directive 2012/33/EC

- **The IMO limits are being transposed into European law**

- The 0.5% limit is brought into force on 1 January 2020 for all EU sea territory, even if on global scale this limit gets postponed to 2025

AND

- the Commission was asked by the legislation to consider extending the stricter SECA limits to all EU territorial waters

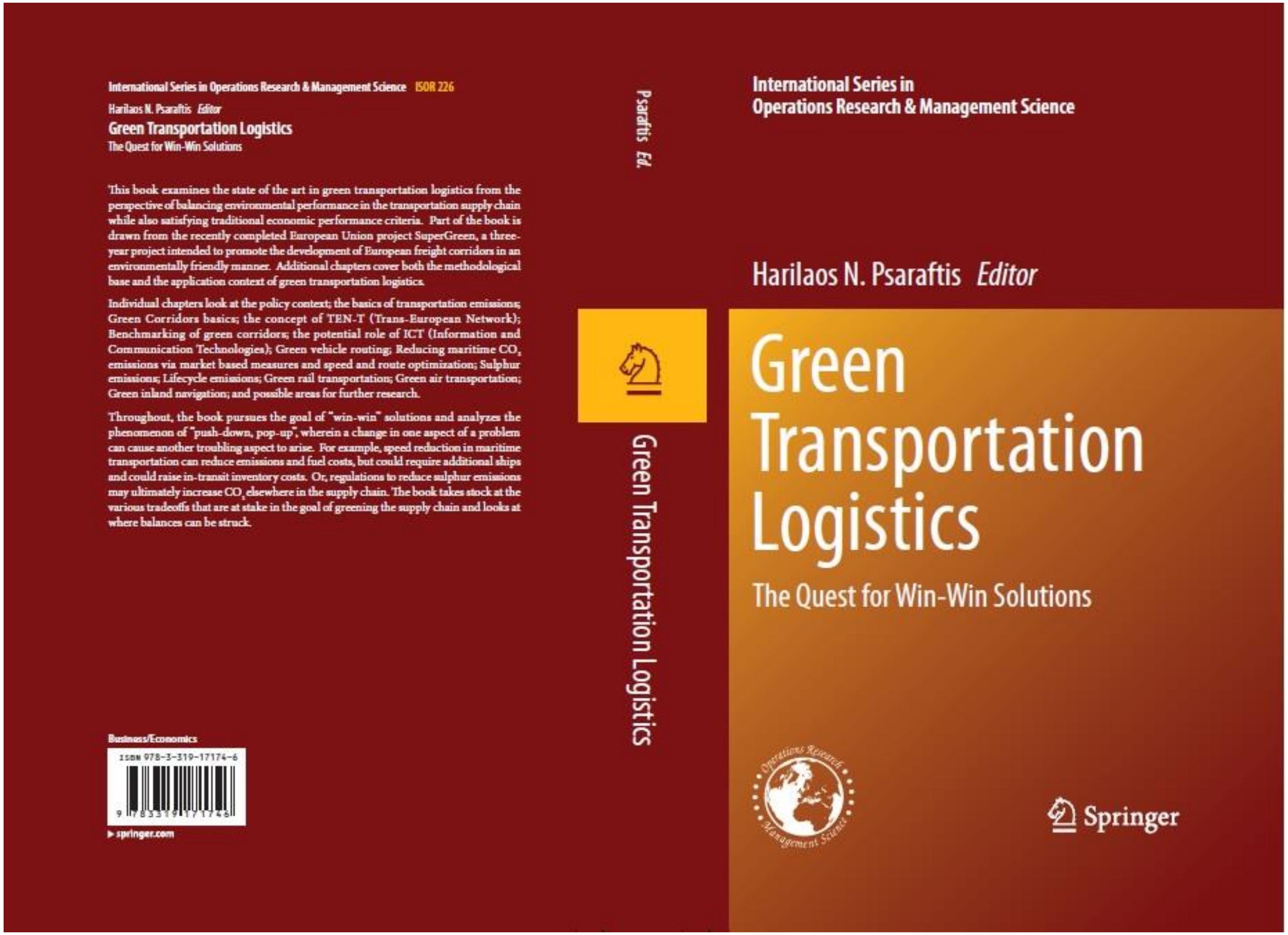
The problem

- Low-sulphur fuel (Marine Gas Oil-MGO or Marine Diesel Oil-MDO) is substantially more expensive than Heavy Fuel Oil (HFO).
- In short-sea shipping such a freight rate increase may induce shippers to use land-based alternatives (mainly road).
- A reverse shift of cargo would go against the EU policy to shift traffic from land to sea to reduce congestion, and might ultimately increase the overall level of CO_2 emissions along the entire supply chain.

Conclusions

- Spectrum of policies for sustainable transport is very broad and comprehensive
- Some EU policies may serve as models for global application
- Regional policies may cause distortions and side-effects
- A holistic approach is some times lacking

For more info (new book)



Thank you very much!

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