Environmental KPIs for the Motorways of the Sea

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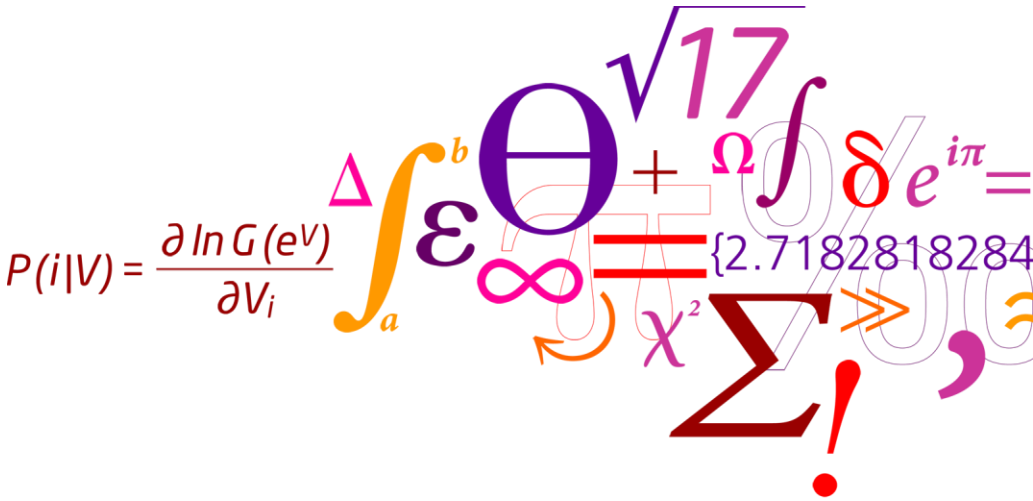
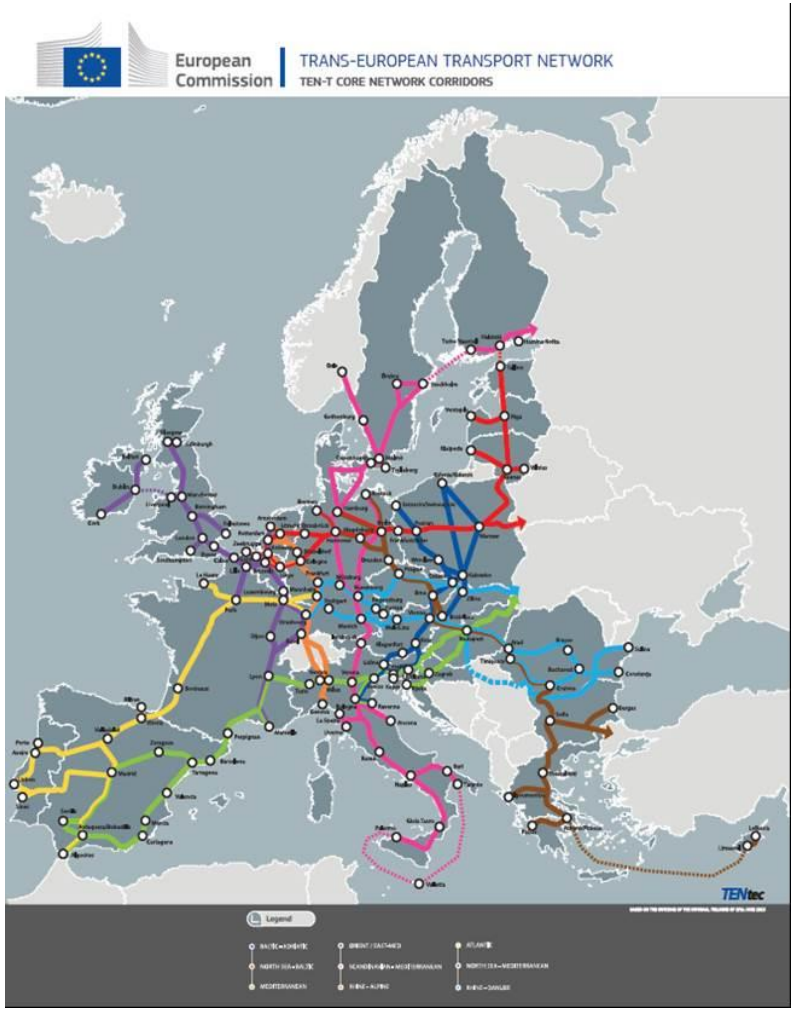


DTU Transport
Department of Transport

Purpose

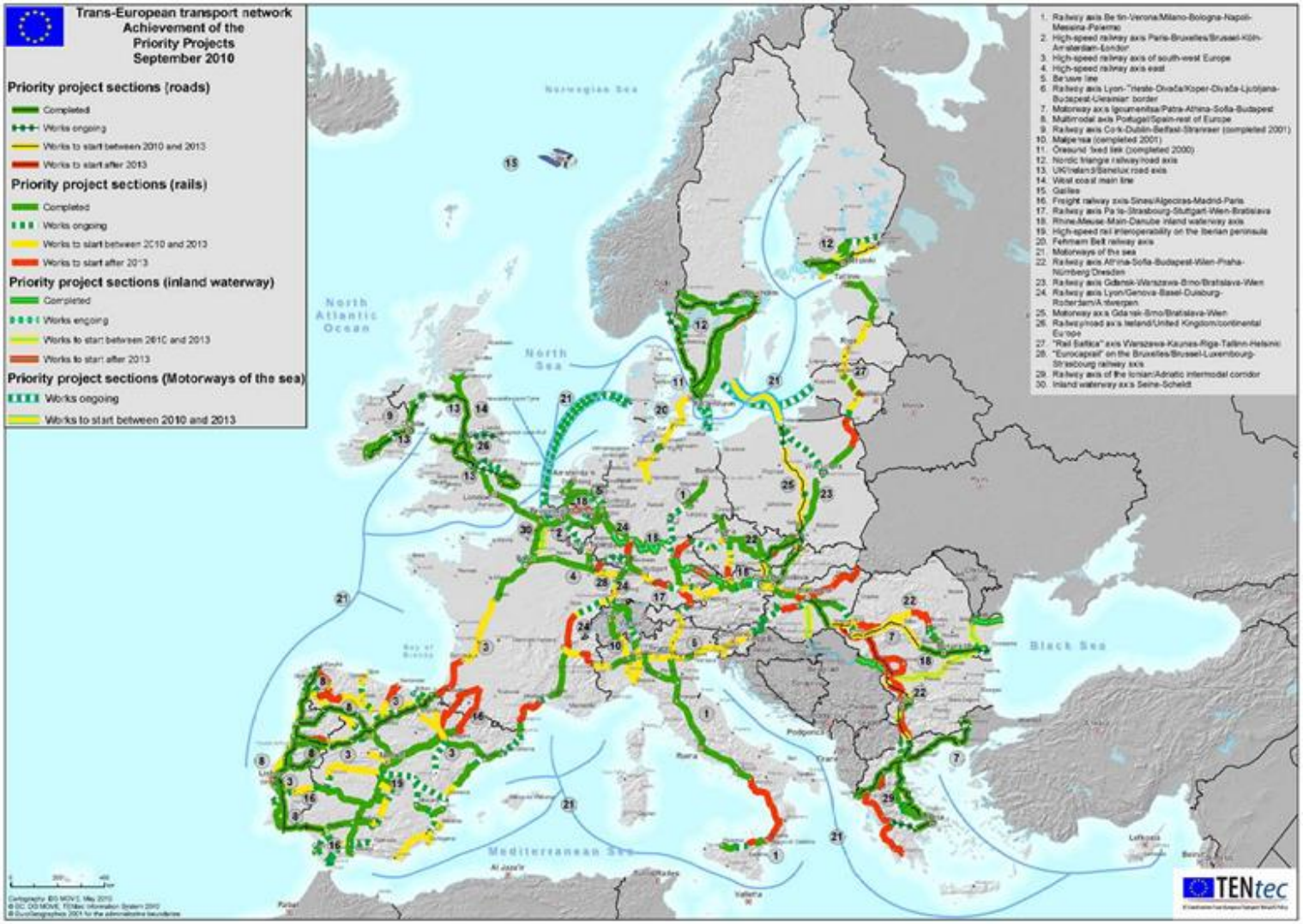
- Basic question:
- What should be appropriate environmental KPIs for the Motorways of the Sea?
- A related question:
- Can the MoS contribute to a green (sustainable) transport system in Europe?

TEN-T core network corridors

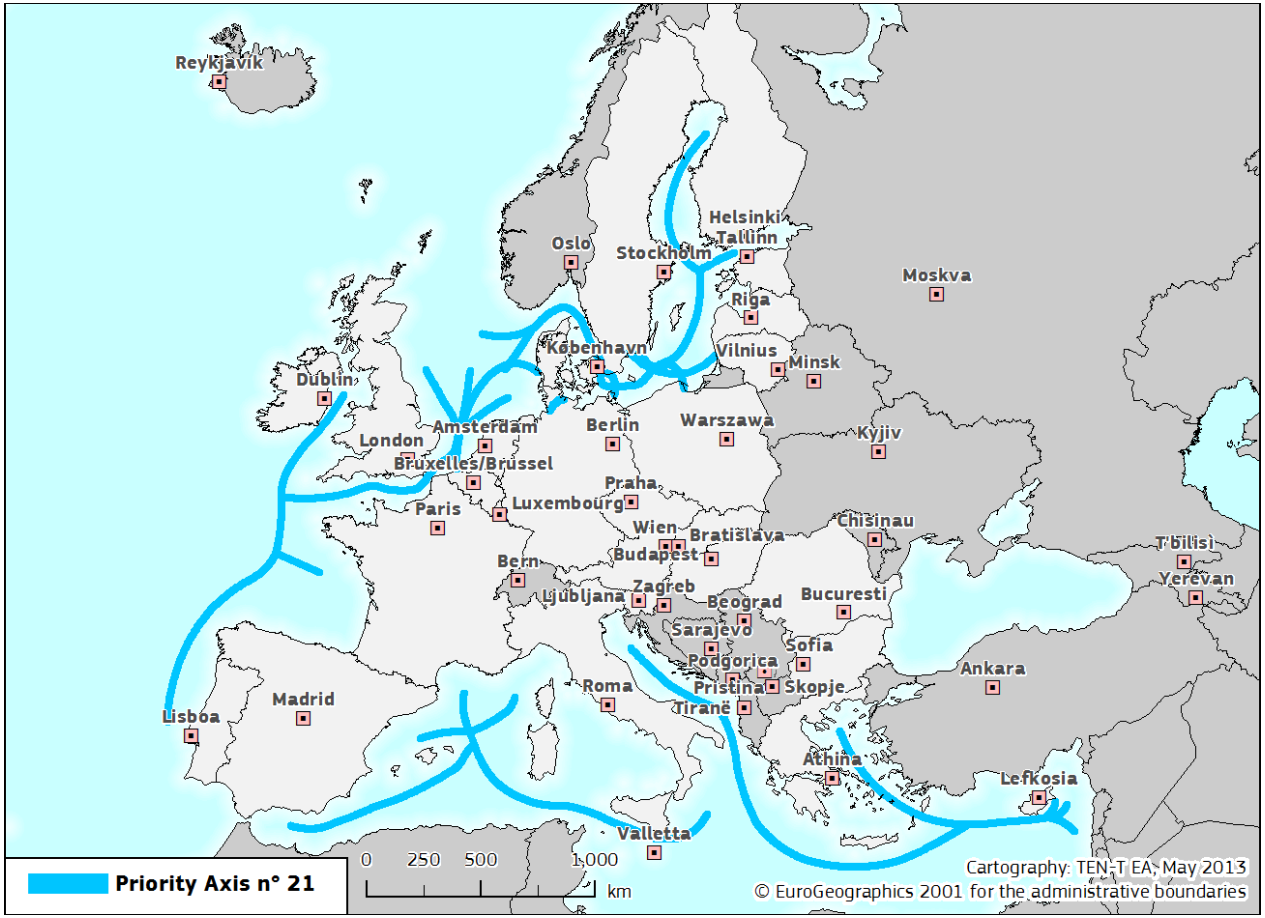


- Regulation EU 1315/2013 (TEN-T guidelines)
- Regulation EU 1316/2013 (Connect Europe Facility)

TEN-T: 30 priority projects



MoS: project No. 21



Legal arsenal: impressive

EU ENVIRONMENTAL LEGISLATION THAT AFFECTS THE MoS

- The Health and Safety in the Workplace Directive,
- The Waste Reception Facilities Directive,
- The Wild Birds Directive,
- The Habitats Directive,
- The Bathing Water Directive,
- The Dangerous Substances Directive,
- The Urban Waste Water Treatment Directive,
- The Shellfish Directive,
- The Water Framework Directive,
- The Environmental Impact Assessment Directive,
- The Strategic Environmental Assessment Directive,
- The Environmental Liability Directive,
- The Sulphur Directive,
- The Shore Power Directive,
- The Maritime Spatial Planning Directive, and
- The MRV Regulation.

(16 and counting!)

Basic question

- Is compliance with with all these directives and regulations a necessary and sufficient condition for **green (sustainable)** MoS?

- A: It is necessary, but not sufficient

Q: What is "green" ?

- **A: Achieve an acceptable environmental performance, *while at the same time respecting traditional economic performance criteria***

- Rationale: if traditional economic criteria are NOT met, solutions may not be viable to private operators and trade may decrease, or even cease to exist

- **'Win-win'** solutions must be sought

Making MoS greener

- FACT: Before you try to **improve** something, you should be able to **measure** it first

- MoS performance should be measured by well-defined **Key Performance Indicators (KPIs)**

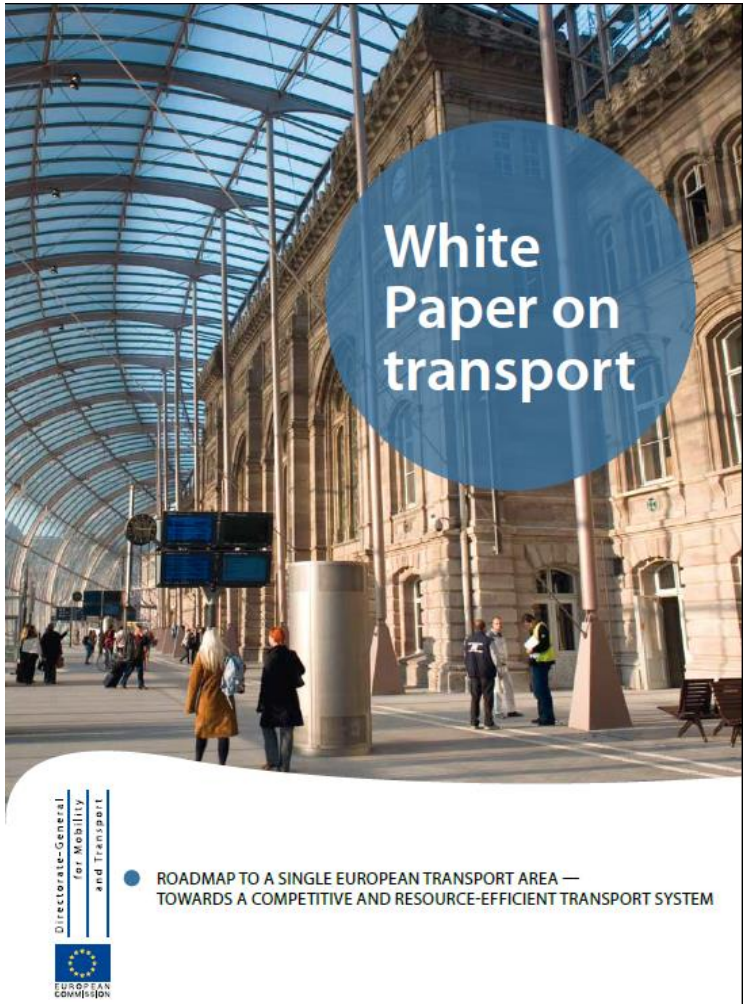
Focus on **emissions**

- **Acceptable environmental performance**

= Acceptable level of emissions

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

GHGs: 2011 Transport White Paper

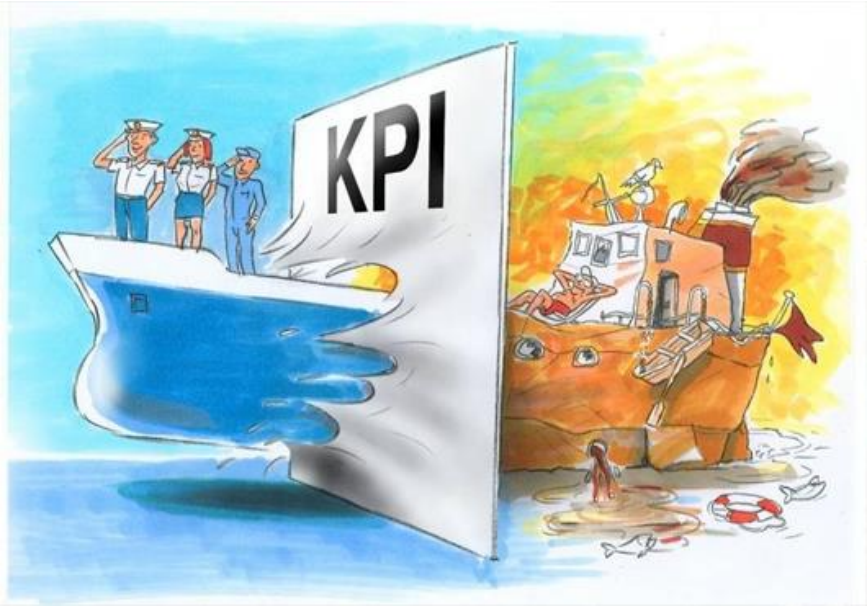


(among other things)

- Sets a goal of reducing GHG emissions from transport (all modes) by 60% by 2050 vis-à-vis 1990 levels
- **Q: how can such an ambitious goal be met while at the same time trade staying alive?**
- **A: Role of MoS can be critical**

Key Performance Indicators (KPIs)

- What are reasonable KPIs?
- What is an appropriate approach?



KPIs: no start from scratch

- Enter supergreen

- European green corridors
- EU FP7, 2010-2013
- 22 partners
- www.supergreenproject.eu

SuperGreen initial list: 17 KPIs!

Efficiency	Absolute cost	€/tonne
	Relative cost	€/ton-km
Service quality	Transport time	hours
	Reliability (time precision)	% of shipments on time
	Frequency of service	number per week
	ICT applications	scale 1-5
	Cargo security	incidents/shipments
	Cargo safety	incidents/shipments
Environmental Sustainability	**CO_2-eq**	**g/ton-km**
	SOx	**g/1000 ton-km**
	NOx	**g/1000 ton-km**
	PM_{10}	**g/1000 ton-km**
Infrastructural Sufficiency	Congestion	average delay/ton-km
	Bottlenecks	scale 1-5
Social issues	Land use (urban & sensitive areas)	% of buffer zone
	Traffic safety	fatal.& ser.injur./m tkm
	Noise	% of length >50/55 dB

Process

- Methodology
- Analysis
- 4 stakeholder workshops
- Advisory Committee
- More analysis
- Consultation, consultation, and more consultation!

Result: final list of most important KPIs (6)

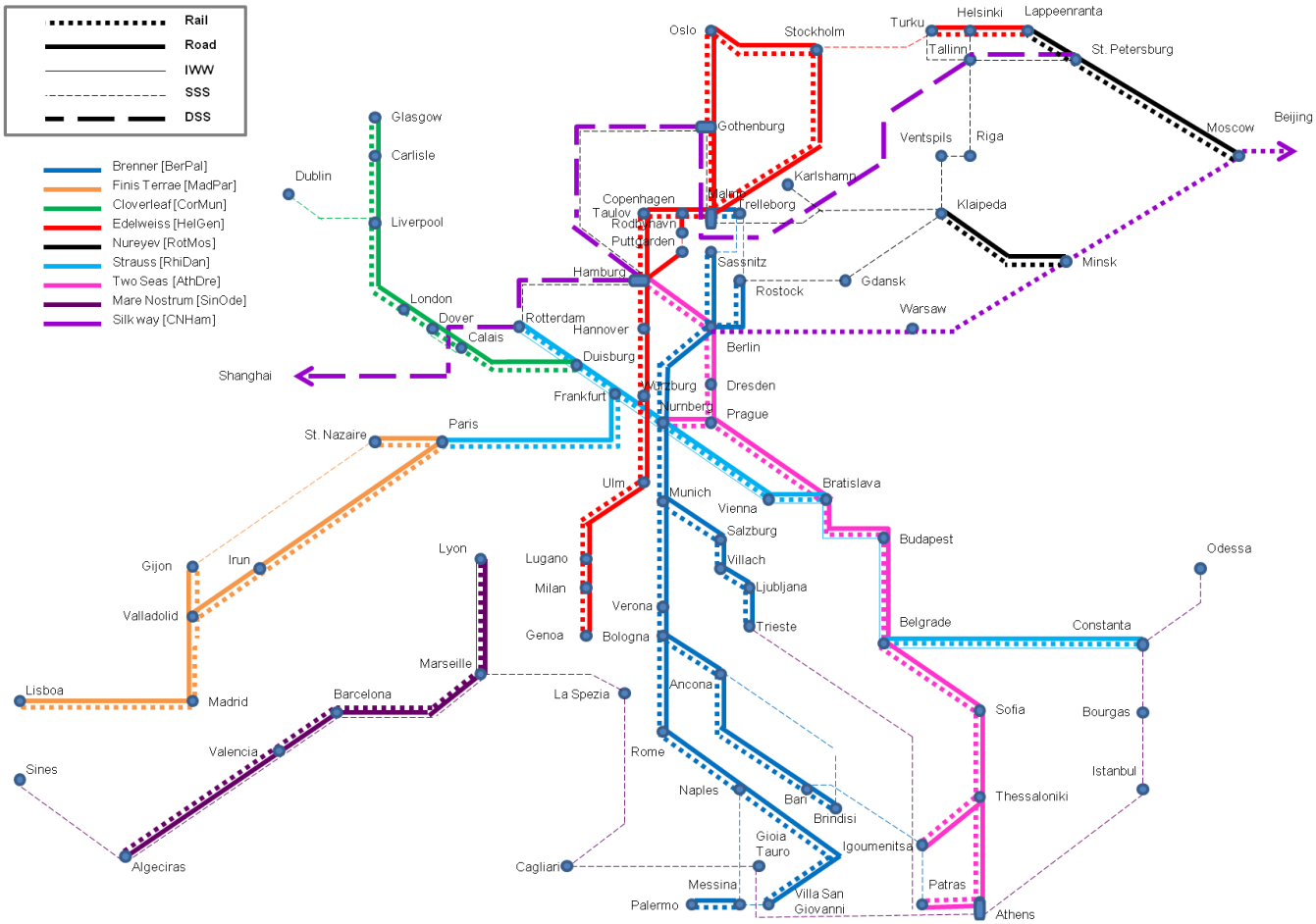
Relative transport cost	€/ton-km
Transport time (or speed)	hours (or km/h)
Reliability (on-time delivery)	% of shipments
Frequency of service	number per year
CO_2-eq emissions	**g/ton-km**
SOx emissions	**g/ton-km**

However!

- KPIs should be finalized and refined **by the corridor management** on the basis of the objectives being pursued for each corridor

- (Eg, may add KPIs on oil pollution, noise, etc)

The 9 SuperGreen corridors (2010)



What about the MoS KPIs?

- For several of the KPIs, ships are doing better than other modes.

- Doing better: Cost, CO_2 emissions
- Doing worse: Transport time, SOx
- Other KPIs: mixed

- Key question: How can KPIs be improved?

Benchmarking results

Corridor	Mode	Cost (€/tkm)	Av. speed (km/h)	Reliability (%)	Frequency (no/year)	CO_2 (g/tkm)	SOx (g/tkm)
Brenner	Intermodal	0.03-0.09	9-41	95-99	26-624	10.62-42.11	0.02-0.14
	Road	0.05-0.07	19-40	50-99	104-2.600	46.51-71.86	0.05-0.08
	Rail	0.05-0.80	44-98	50-100	208-572	9.49-17.61	0.04-0.09
	SSS	0.04	23	100	52	16.99	0.12
Cloverleaf	Road	0.06	40-60	80-90	4.680	68.81	0.09
	Rail	0.05-0.09	45-65	90-98	156-364	13.14-18.46	0.01-0.02
Nureyev	Intermodal	0.10-0.18	13-42	80-90	156-360	13.43-33.36	0.03-0.15
	SSS	0.05-0.06	15-28	90-99	52-360	5.65-15.60	0.07-0.14
Strauss	IWT	0.02-0.44	-	-	-	9.86-22.80	0.01-0.03
Mare Nostrum	SSS	0.003-0.20	17	90-95	52-416	6.44-27.26	0.09-0.40
	DSS	-	-	-	-	15.22	0.22
Silk Way	Rail	0.05	26	-	-	41.00	-
	DSS	0.004	20-23	-	-	12.50	-

Follow on corridor projects at DTU

INTERREG programme

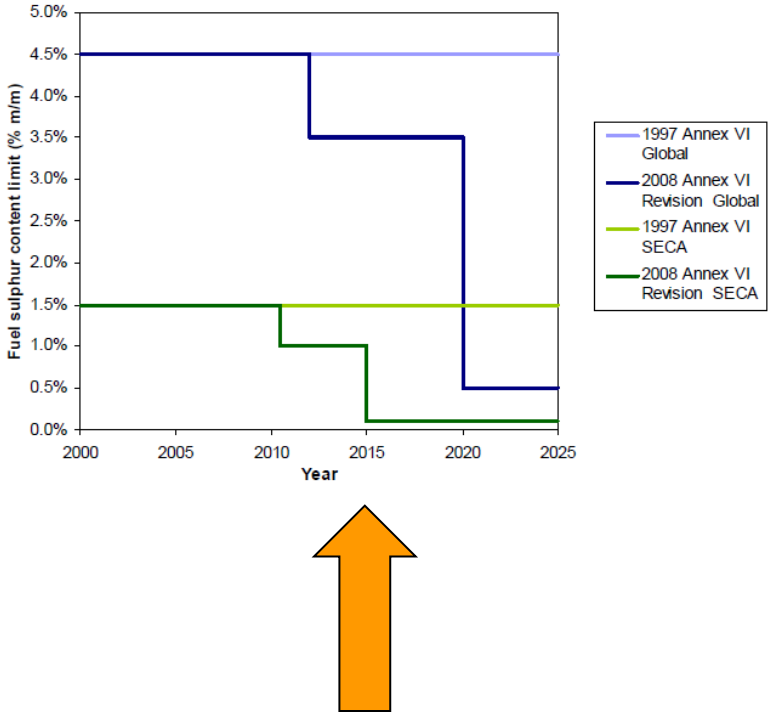
- GreCOR (completed)

- TENTACLE (new)

- Scandria2Act (new)

SOx: IMO MARPOL Annex VI

Sulphur caps



ECAs/SECAs

The Med: not a SECA

- (1) Should the Med be a SECA?

- (2) What happens in 2020
  - EU 0.5% sulphur cap is implemented
  - But global 0.5% sulphur cap is implemented in 2025

- Enforcement challenge
- Possible distortions

DTU project

NEW

- **Mitigating and reversing the side-effects of environmental legislation on Ro-Ro shipping in Northern Europe**

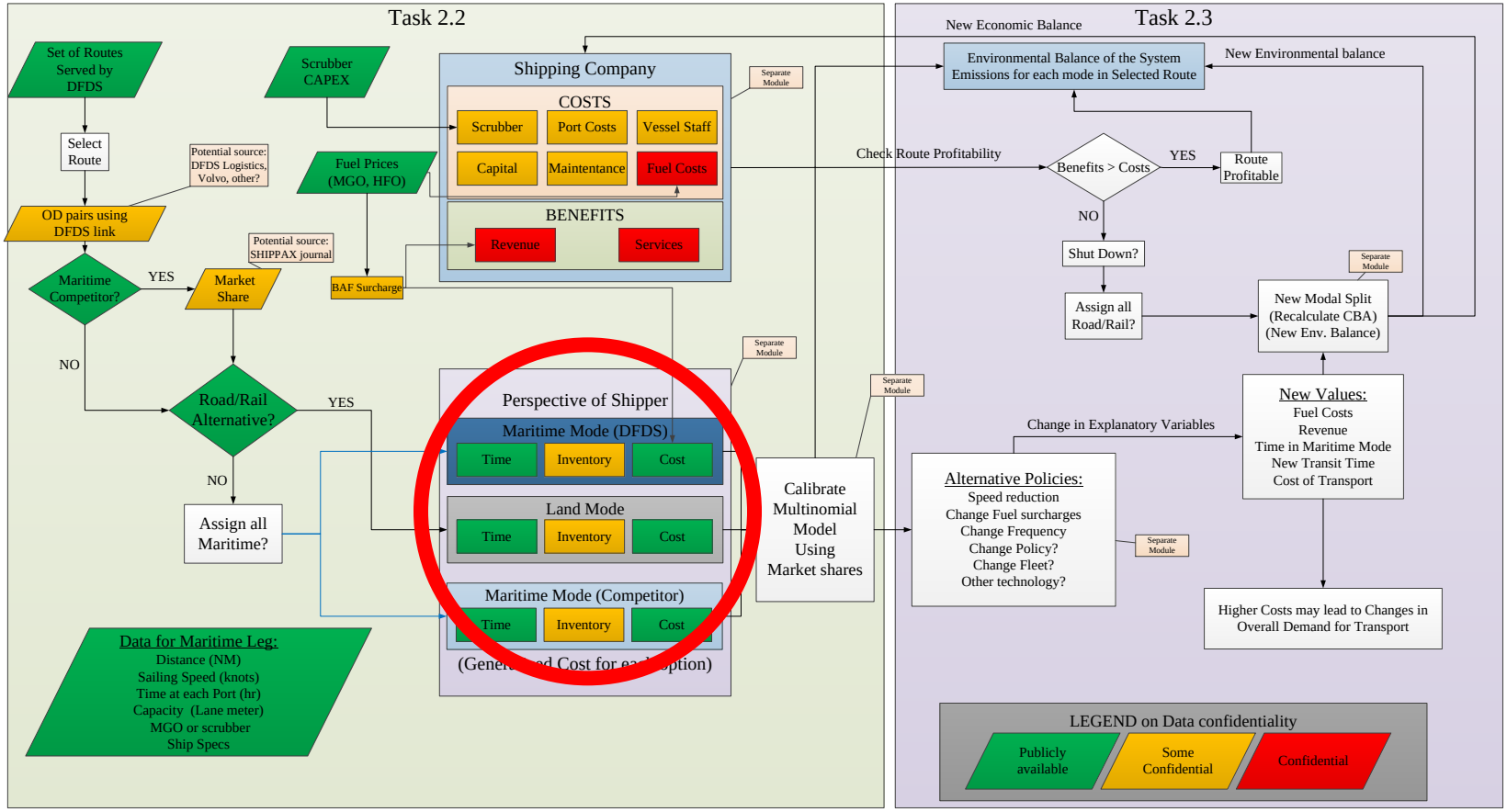
- Main objective: identify and assess possible technical, operational, regulatory and financial measures for the mitigation and reversal of the negative repercussions of environmental legislation to the market shares of Ro-Ro shipping in Northern Europe.

- Sponsor: Danish Maritime Fund
- Industry partner: DFDS
- Duration: 2 years (15/6/2015-14/6/2017)

DFDS routes to study (7)

Route	Vessel		Vessel Capacity	
	Type	Tech	Lane meters	Passengers
NORTH SEA				
Gothenburg – Ghent – Brevik	RoRo	Scrubber	3831	12
	RoRo	Scrubber	3831	12
	RoRo	Scrubber	3831	12
Copenhagen – Oslo	Cruise	Scrubber	(450 cars)	1790
	Cruise	MGO	(320 cars)	1989
Esbjerg – Immingham	RoRo	Scrubber	3000	12
	RoRo	MGO	3000	12
Rotterdam – Felixstowe	RoRo	Scrubber	2772	12
	RoRo	Scrubber	2772	12
	RoRo	MGO	1680	12
BALTIC SEA				
Klaipeda – Kiel	RoPax	Scrubber	2115	328
	RoPax	Scrubber	2240	328
Klaipeda – Karlshamn	RoPax	MGO	2490	600
	RoPax	MGO	2496	600
CROSS CHANNEL				
Dover – Calais	RoPax	MGO	1784	1100
	RoPax	MGO	1949	405

Modal split model development and calibration



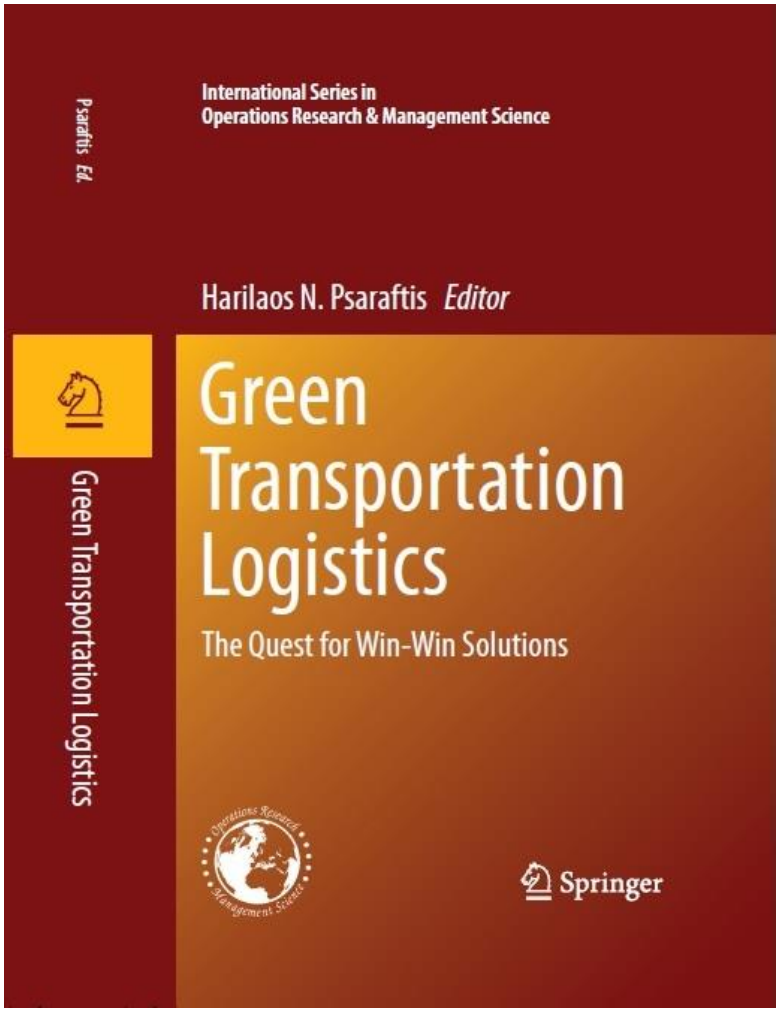
More info

- www.roroseca.transport.dtu.dk
- Workshop at DTU, **June 16, 2016**

Conclusions

- Environmental KPIs are important, BUT: **for viable MoS, additional KPIs should also be looked at**
- The MoS can contribute to important EU sustainability goals
- Some work ahead to fully realize them
- The MoS DIP seems the main tool toward that objective

New Book



- 15 chapters, 548 pages
- Covers all modes of transport
- Plus corridors, TEN-Ts, KPIs, etc

Thank you very much!

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