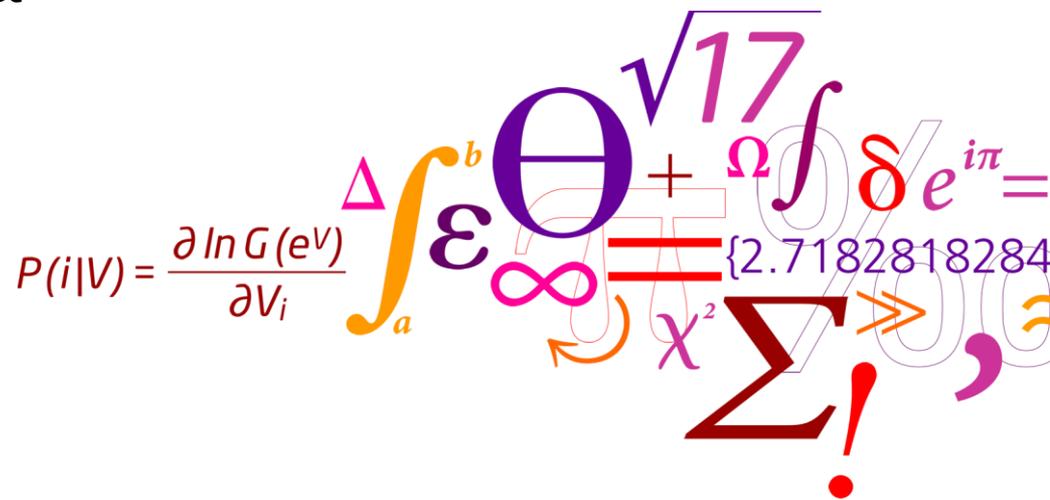


## Project overview

Harilaos N. Psaraftis

Professor

Project Manager, RoRoSECA project


$$P(i|V) = \frac{\partial \ln G(eV)}{\partial V_i} \int_a^b \epsilon \Theta + \Omega \int \delta e^{i\pi} = \{2.7182818284\}$$

# The RoRoSECA project



- Funded by the Danish Maritime Fund (DMF)



- Supplementary funding: Orients Fund

- Industry partner: DFDS



## Project full title:

- **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.
- Duration: 2 years (15/6/2015-14/6/2017)

# Project team

- Harilaos N. Psaraftis, Professor



- Jacob Kronbak, Assoc. Professor



- Thalís Zis, Postdoc



- George Panagakos, Postdoc



- Hans Otto Kristensen, consultant



# Project Advisory Committee

- Poul Woodall, DFDS



- Mogens Schrøder Bech, Danish Maritime Authority



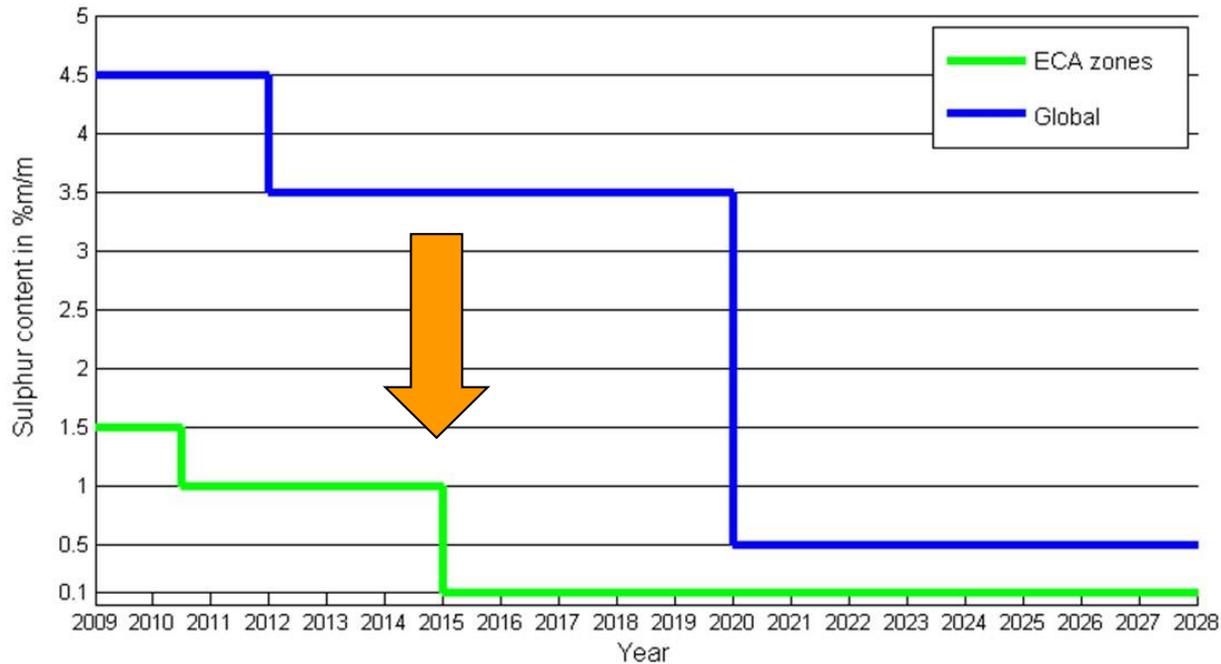
- Helle Knudsen, Danish Shipping



- Valdemar Ehlers, Danish Maritime



# Background: Marpol Annex VI



	<b>Year</b>			
Areas	2005-2012	2012-2015	2015-2020	2020 on
Within SECA	1.5	1	0.1	0.1
Outside SECA	4.5	3.5	3.5	0.5

## The problem

- Higher fuel prices due to 0.1% sulphur content as of 1 Jan. 2015 risk making Ro-Ro shipping less competitive vis a vis land based modes.
  - Possible modal shifts.
  - Risk of route closure.
  - Some operators have shut down some of their routes.
- **Q: What can be done to alleviate problem?**

## Main issues to be addressed

- What is the economic impact of the new legislation?
- What is the environmental impact of the new legislation?
- What may be possible modal shifts?
- What measures can the Ro-Ro operator take to mitigate and reverse the situation?
- What policy measures are deemed the most appropriate?

# Press releases **before 01/01/2015:** **GLOOM AND DOOM**

## SECA SHUTS DOWN TRANSFENNICA IBERIAN SERVICE

The Dutch-owned short-sea shipping line Transfennica (part of the Spliethoff Group) has announced that it is to cease its "Motorways of the Sea" ro-ro service between Bilbao, Portsmouth and Zeebrugge at the end of this month (December).

The decision is a direct result of the introduction of stricter new low-sulphur emission controls from 1 January 2015 in the Baltic Sea, the Kattegat, the North Sea and English Channel. A further SECA extends in a 200 nautical miles wide belt along the coasts of the USA and Canada.

## SECA requirements lead to new European rail link

**CARRIERS:** Railway company ERS is opening a new route in Europe in light of rising customer demand following the implementation of new sulphur regulations. Many customers and countries are willing to change their mode of transport in order to save money.

## DFDS closes Sassnitz-Klaipeda connection

Publication date: 2013-08-30

Tags: maritime, germany, denmark, lithuania



**DFDS Seaways has decided to close the ferry service between Sassnitz, Germany and Klaipeda, Lithuania with effect from the end of September.**

Previously a busy connection, the route has over the years become economically unviable. As Vice President of DFDS, Anders Refsgaard, stated: "We have fought hard to get new customers and improve revenue and profit, but unfortunately without success". He added, that with the outlook on continued decline in profits, and in light of the new sulphur regulations to be introduced from 1 January 2015, the company does not believe that it will be possible to turn the tide on the crossing.

# What actually happened

Stena Line records 16% yearly growth on North Sea route



Stena Britannica sails between the UK port of Harwich and the Hook of Holland in the Netherlands

DFDS Wraps Up Record Year, Expects Higher Revenue in 2016



Image Courtesy: DFDS

Danish shipping and logistics company DFDS posted a profit of DKK 1.07bn (USD 151m), up by 89pct when compared to last year's DKK 571 million.

For the full-year 2015, the group reported revenue increase of 5% to DKK 13.5bn. Organic revenue growth, adjusted for route closures and acquisitions, was 7% mainly driven by 7% higher freight shipping volumes and 8% more passengers. In the fourth quarter, organic revenue growth was 10%.

## P&O breaks Channel freight record in 2015

By Charlie Bartlett from London

P&O Ferries transported more freight between Dover and Calais in 2015 than any other year in its "modern history," amounting to 1,340,317 trucks.

The result is a 22% year-on-year increase over 2014, and is due in part to disruptions at the channel tunnel, which caused a 172% year-on-year increase in HGVs on its separate Teesport to Zeebrugge route throughout the month of July.

The group pressed a sixth ship back into service on the English Channel that month in order to increase capacity.



# Fuel prices after mid 2014



## Lucky with fuel prices



- The fact that fuel prices have dropped precipitously since the summer of 2014 has somehow alleviated the repercussions of the new regulations.
- This has also masked the extent of the problem.
- However, the risk of route closure still exists, particularly if fuel prices rise again in the future.
  
- → Need to be on the alert.

# Project challenge

- **Q: Can one isolate the effect of the sulphur legislation from that of other developments that happened in parallel?**

- Precipitous drop in fuel prices
- Russian economic crisis

- **A: YES!**

# Project structure

## 4 Work Packages

- WP1 Project management
- WP2 Enhanced modal split and emissions models (Year 1)
  - Task 2.1 Scenario definition and data collection
  - Task 2.2 Modal split model development and calibration
  - Task 2.3 Emissions and external cost calculator
- WP3 Measures to mitigate or reverse modal shifts (Year 2)
  - Task 3.1 Measures from the Ro-Ro operator
  - Task 3.2 Measures from policy makers
- WP4 Dissemination

# Main route selection criteria

- 6-8 Routes
- Geographical Balance
- Distance (good spread between short and long routes)
- Volume & frequency of service
- Vessels (various types & abatement technologies)

# Current DFDS network

- 18 Routes (22 links)
- ~38 vessels
- Up to 535 departures/week, 13 countries, 30 ports
- 4 main areas
  - North Sea (9 Routes, 20 vessels)
  - Baltic Sea (5 Routes, 7 vessels)
  - Cross-Channel (3 Routes, 6-7 vessels)
  - Mediterranean (1 Route, 1-2 vessels)



# Active routes to study (7+2)

## Main

## plus

Route	Vessel		Vessel Capacity	
	Type	Tech	Lane meters	Passengers
<b>NORTH SEA</b>				
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
<b>BALTIC SEA</b>				
Klaipeda – Kiel	RoPax	Scrubber	2115	328
	RoPax	Scrubber	2240	328
Klaipeda – Karlshamn	RoPax	MGO	2490	600
	RoPax	MGO	2496	600
<b>CROSS CHANNEL</b>				
Dover – Calais	RoPax	MGO	1784	1100
	RoPax	MGO	1949	405

Esbjerg- Harwich (recently shut down)  
Marseille-Tunis (outside SECA)

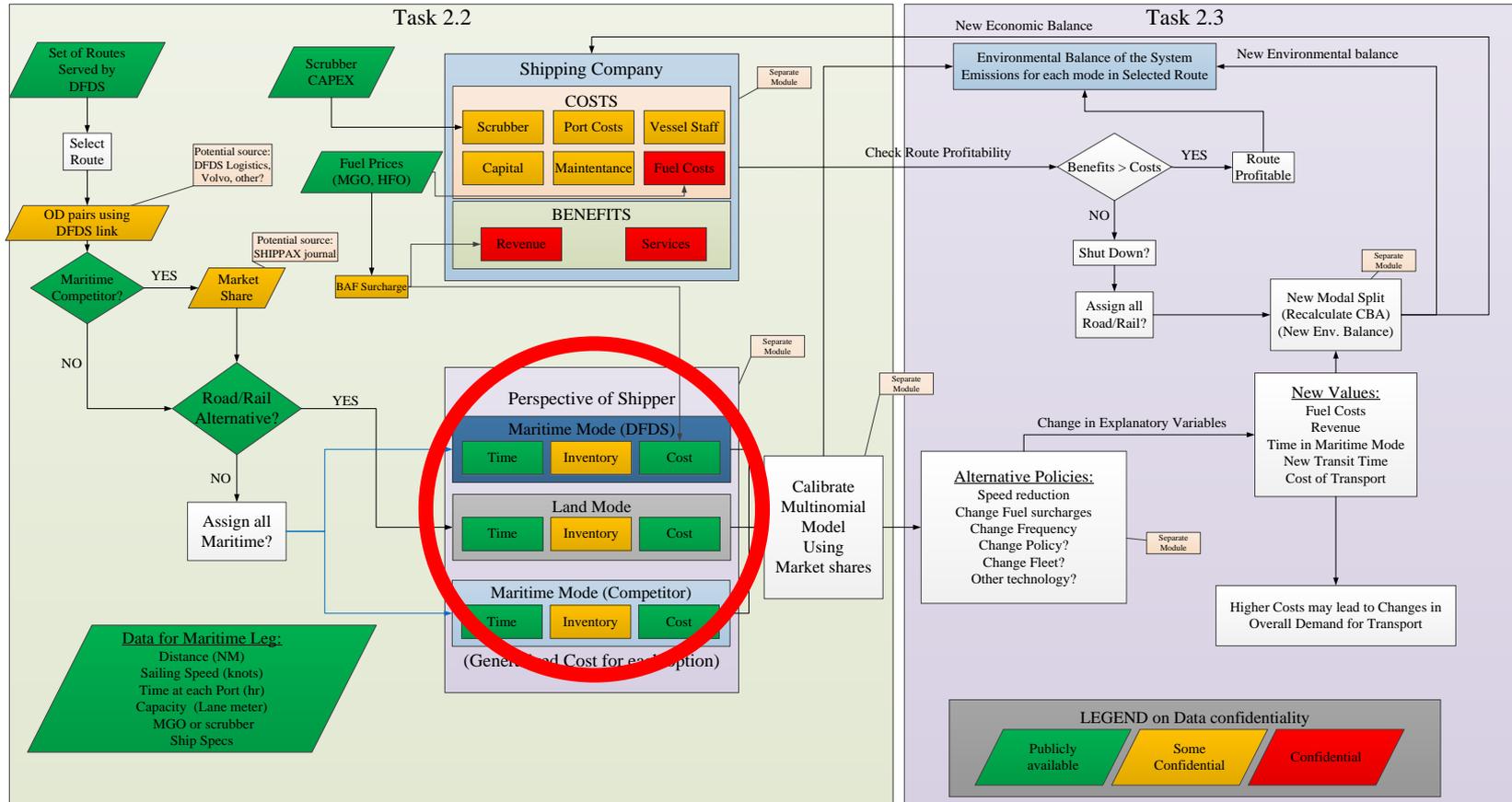
## Volume

- The selected routes account for approximately 43% of the total DFDS lane meters capacity

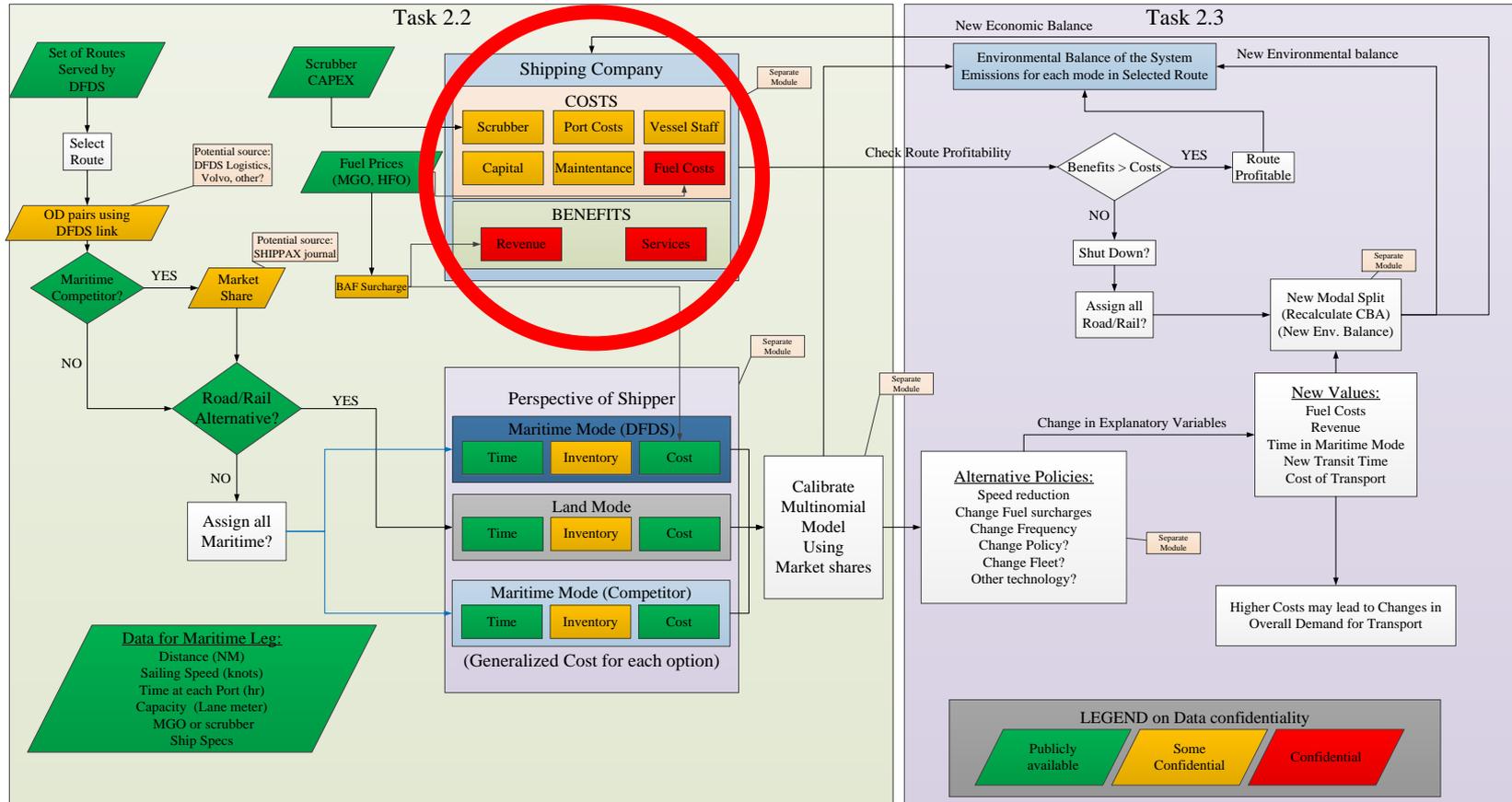
## Vessel Type and Technology

- 2 Cruise Ships (1 MGO, 1 scrubbers)
- 8 Ro-Ro (3 MGO, 5 scrubbers)
- 6 Ro-Pax (4 MGO, 2 scrubbers)

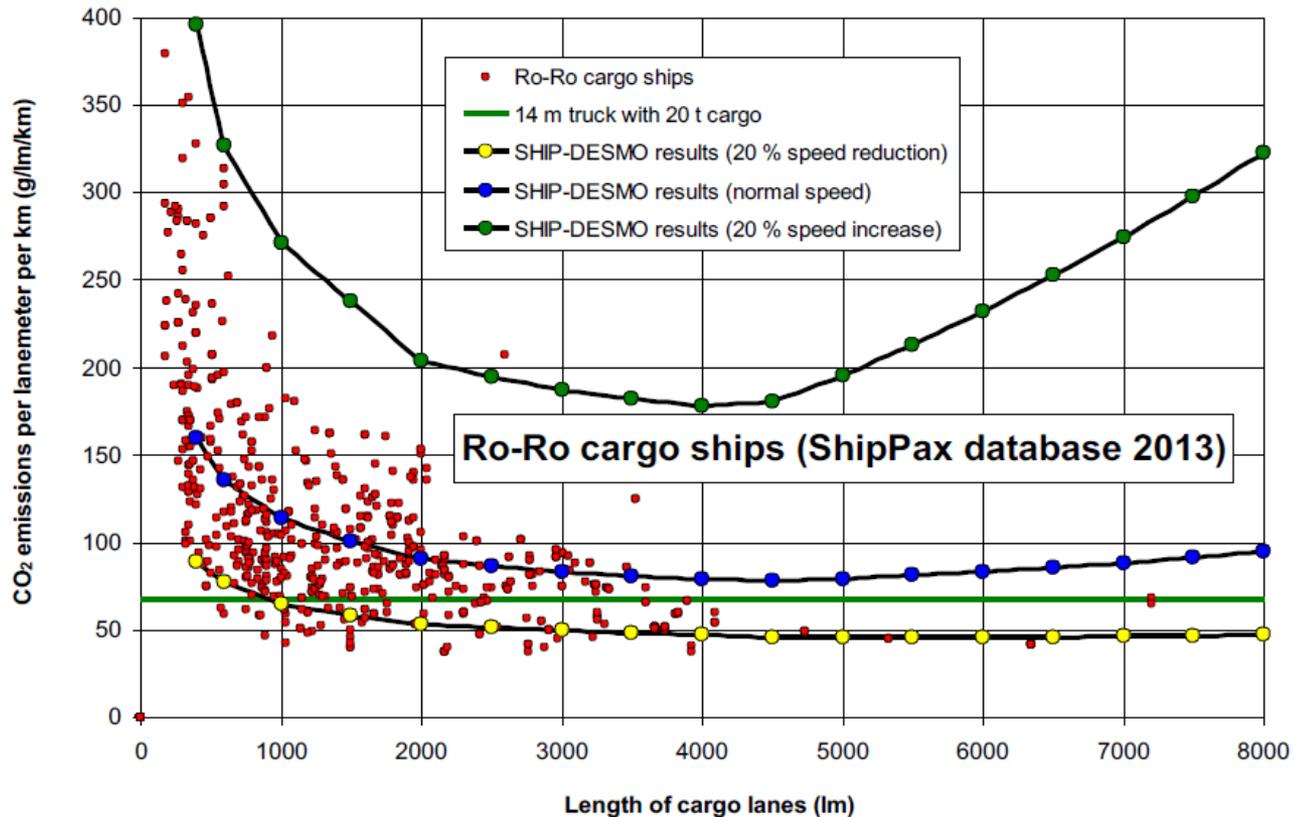
# Modal split model development and calibration



# Modal split model development and calibration



# SHIP DESMO model (emissions and external costs calculator)



## 3 scenarios on Fuel Price

- **Fuel case 1: What actually happened (MGO with actual prices)**
- **Fuel case 2: What would happen if MGO prices returned to 2014 levels**
- **Fuel case 3: What would happen if HFO was still allowed (Actual prices)**

## Summary of conclusions (Year 1)

- First attempt to examine the effect of the new SECA limits, and dissect it from the record low fuel prices that were observed in the last two years
- Maritime shares actually increased due to observed low prices
- Maritime shares would have increased further if HFO were still allowed
- Maritime shares would drop if fuel levels returned to 2014 levels
- Profitability of ship operator is masking the negative effects of the sulphur regulation

# More details in

Transportation Research Part D 52 (2017) 185–201



Contents lists available at [ScienceDirect](#)

Transportation Research Part D

journal homepage: [www.elsevier.com/locate/trd](http://www.elsevier.com/locate/trd)



The implications of the new sulphur limits on the European Ro-Ro sector

Thalis Zis\*, Harilaos N. Psaraftis

*Technical University of Denmark, Copenhagen, Denmark*



- Note: all dissemination output on project's web site.

# Year 2: Examine measures to mitigate or reverse modal shifts

- Task 3.1 Measures from the Ro/Ro operator
  - Speed reduction
  - Service frequency and schedule reconfiguration
  - Fleet and network reconfiguration
  - Alternative fuels such as LNG
  - Other technical measures such as scrubbers
  - Appropriate pricing policies
- Task 3.2 Measures from policy makers
  - Full or partial internalization of external costs, all modes
  - Easing of port dues/fairway dues/ice dues for relevant shipping
  - Public funding or subsidies
  - Any other potential policy measure

# Presentations to follow by

- Thalís Zís: on measures from the Ro/Ro operator and policy makers
- George Panagakos: on external costs of transport
- Jacob Kronbak: on a GIS tool to visualise external costs
- + yours truly: on possible uses and users of these models