# The introduction of 0.1% S fuels in European SECAs

Jasper Faber, 28 March 2017

CE Delft

# CE Delft

- Independent research and consultancy since 1978
- Transport, energy and resources
- Know-how on economics, technology and policy issues
- 40 Employees, based in Delft, the Netherlands
- Not-for-profit
- Projects on environmental impacts of shipping for over 15 years.

Clients: Ports, ACP, International Maritime Organization, European Commission, national and regional governments (Germany, UK, Netherlands), shipping companies, trade associations and environmental NGOs.

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# Outline of the presentation

- Introduction
- Air quality improvements
- Socio-economic benefits and costs
- Economic and business impacts – fuel prices and modal shift
- Compliance and enforcement
- Outlook to 2020
- Conclusions

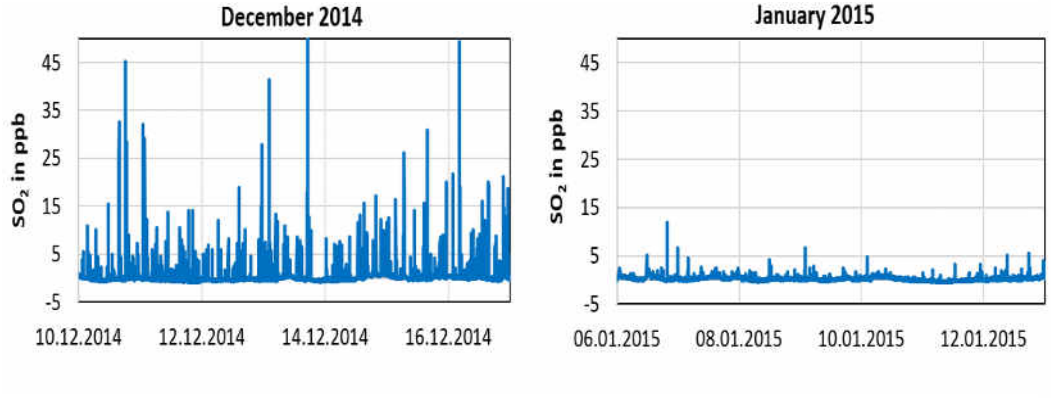
# Introduction

- As of 1 January 2015, the maximum allowed sulphur content of marine fuels in SECAs was reduced to 0.1% from 1.0%.
- Several studies had been published showing negative impacts on demand for sea transport, and predicting price spikes of MGO.
- CE Delft was commissioned by NABU to analyse the impacts of the sulphur cap after one year (spring 2016).

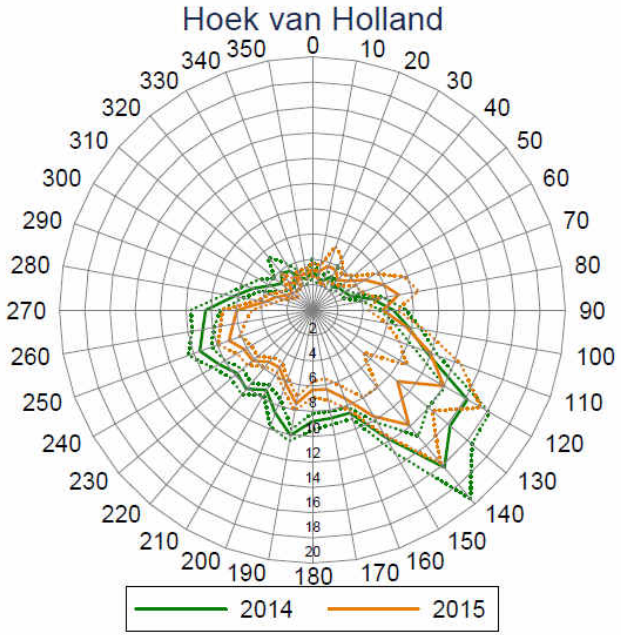
# Air quality improvement

- Rotterdam (NL): 24-37% reduction $SO_2$ conc.
- Great Belt bride (DK):50-60% reduction
- Neuwerk (DE): 50% reduction
- SE Sweden: 50% reduction
- Plymouth (UK): 66% reduction

**Absolute $SO_2$ volume mixing ratio values in December 2014 and January 2015 (Neuwerk, DE)**




**$SO_2$ concentration changes (2.5 - 3.0 µg/m³) for various wind directions, including 95% confidence interval (0=North; DCMR, 2015)**

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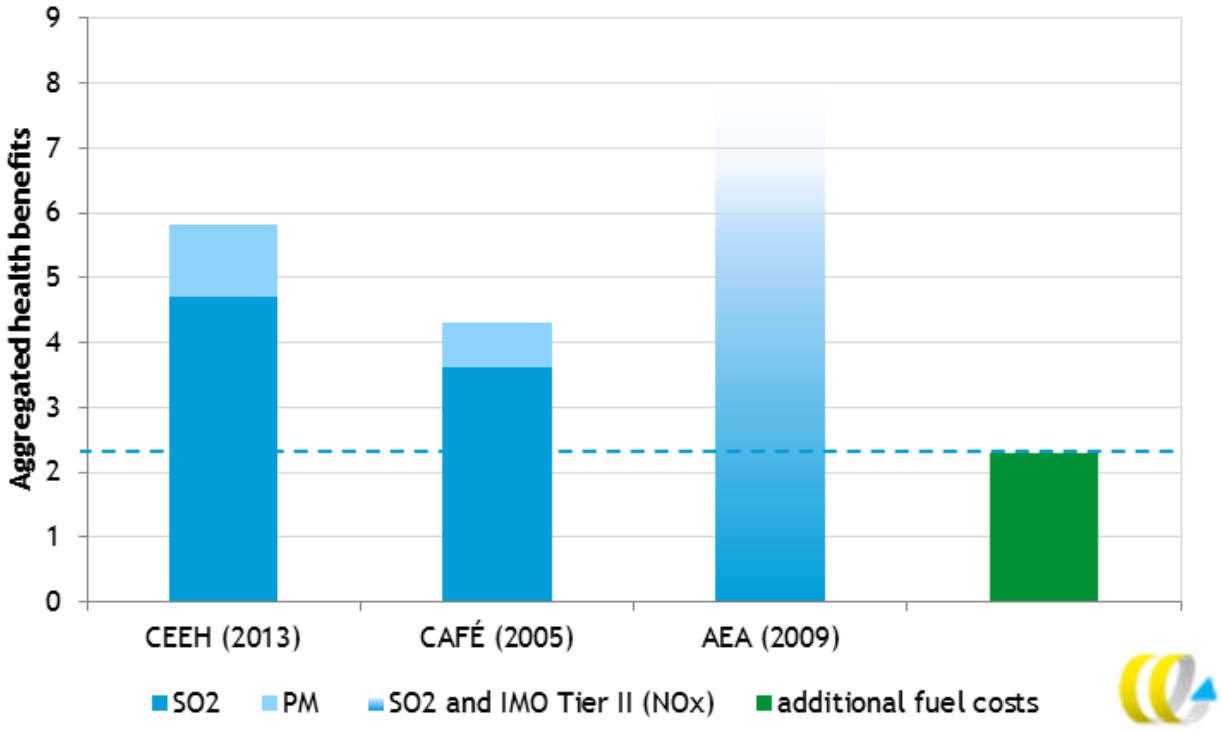
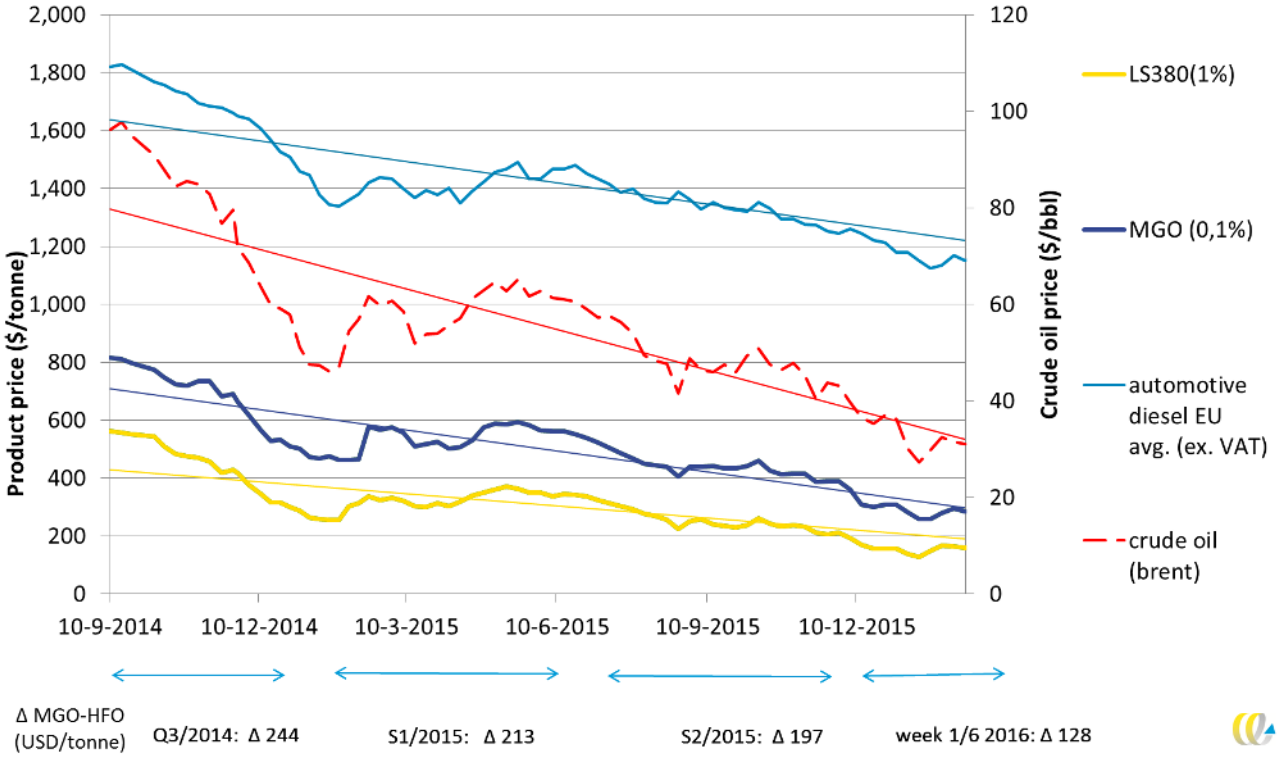
# Socio-economic costs and benefits of 0.1% Sulphur

- North sea and Baltic sea
- 1.9-3.5 times higher benefits than average costs in 2015



# Economic impacts - trend in fuel prices



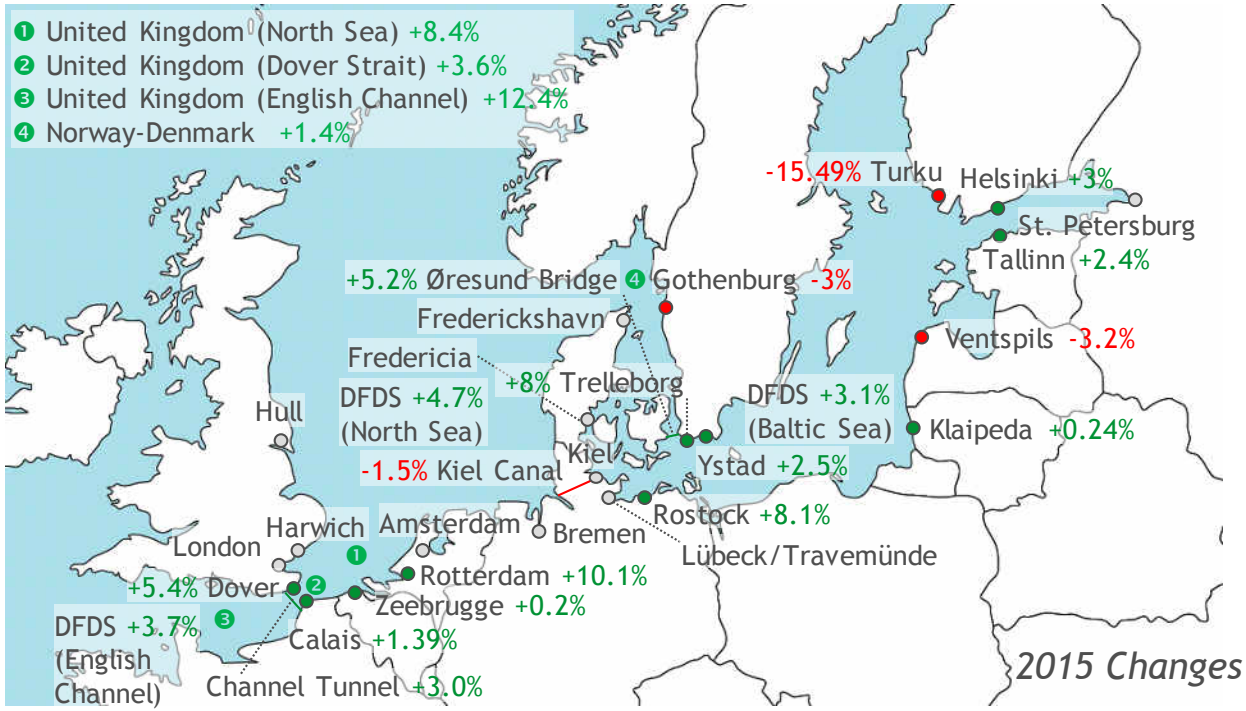

- MGO price reduced more sharply than automotive diesel price:
  - ✓ MGO availability is uncritical (ongoing shift towards distillates)
  - ✓ Economy of scale advantages
- Will prices follow the same pathway again if crude oil prices increase?

# Road fuel vs. MGO (USD/tonne)

| Period | Shipping fuel price | EU weighted average automotive diesel price (incl. excise duty/ excl. VAT) | Delta fuel price |
|---|---|---|---|
| Q4/2014 | 448 (1%HFO) | 1,690 | 1,242 |
| 1st semester 2015 | 528 (0.1% MGO) | 1,414 | 886 |
| 2nd semester 2015 | 406 (0.1% MGO) | 1,306 | 900 |

- Delta fuel price has become smaller
- New fuel types have entered the market (ULSHFO), cheaper than MGO
- Typical RoRo ship with a € 32,500 overall per day: cost increase of 13-25% due to additional fuel costs of 128-244 $/tonne

# Economic impacts - Modal shifts for RoRo?

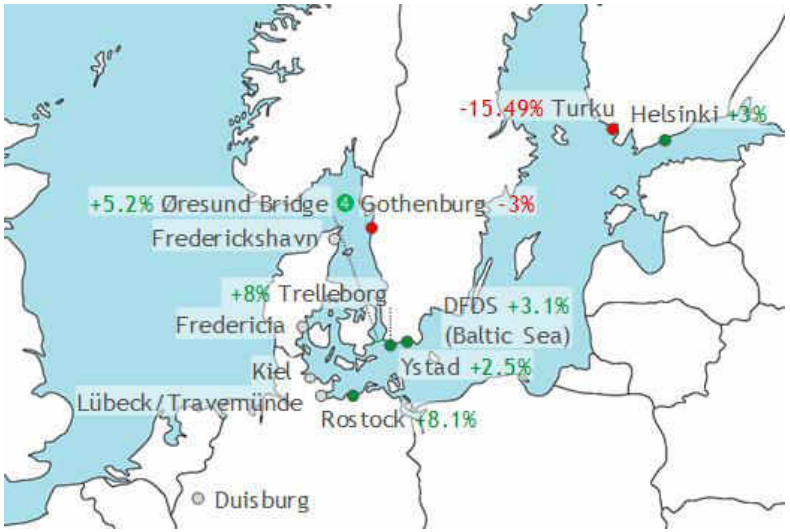



- An expansion of RoRo services over 2015 can be observed
- Positive general sector trend, aftermath of economic crisis
- An ESSF survey amongst ship-owners indicated no modal shifts (71%)

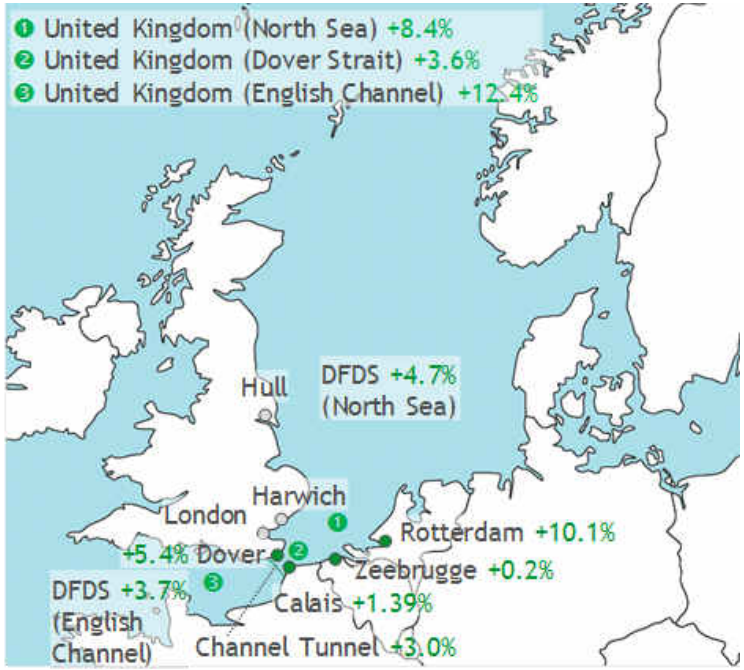
# Example: North sea vs. Dover Strait & Germany-Scandinavia

- Analysis of 5 ex-ante studies on the 2015 fuel sulphur requirement
  - Shifts from North sea to Dover Strait (Channel Tunnel) predicted
  - Shifts to road-only options between Germany and Sweden (Øresund Bridge)
- In most cases, no shifts from longer sea routes to shorter ones
- Probably no shift to on-land routes

*North sea vs. Dover Strait (2015 vs. 2014)*




*North sea vs. Dover Strait (2015 vs. 2014)*

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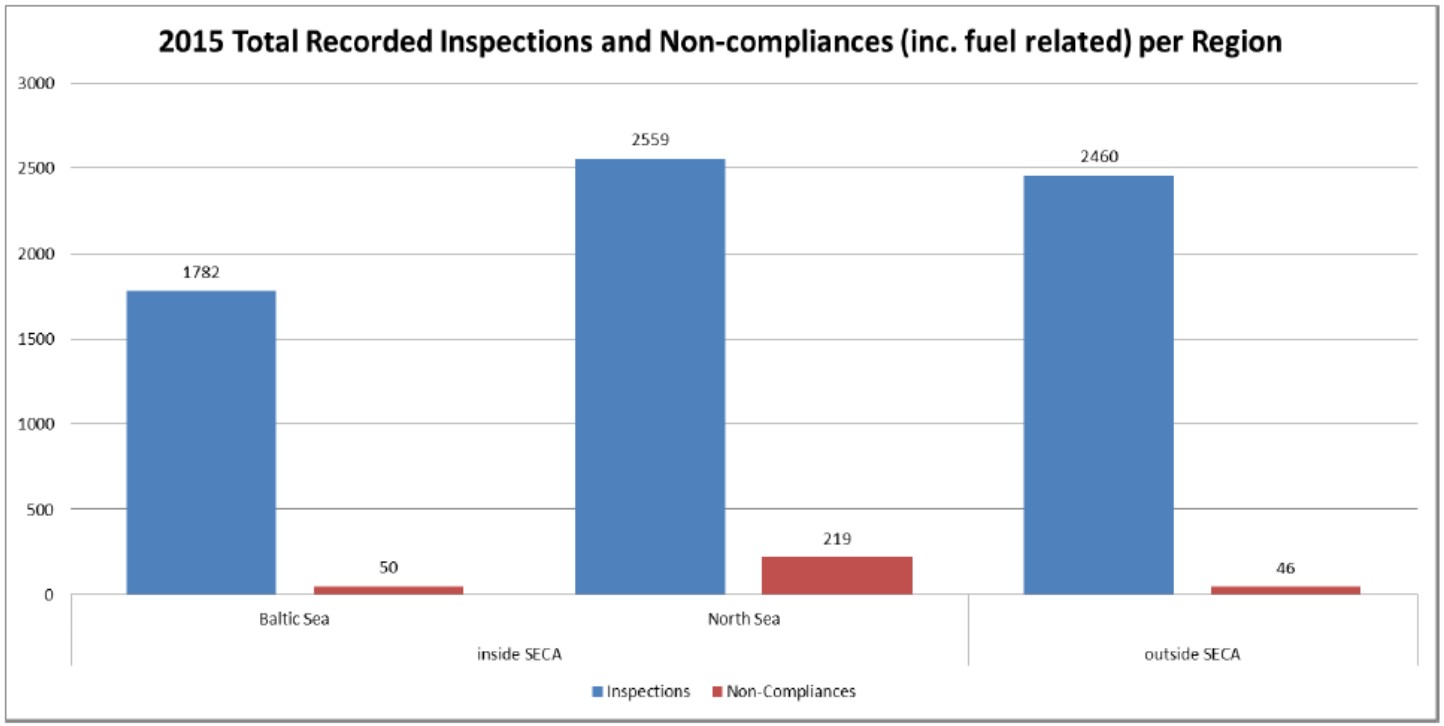
# Compliance and enforcement statistics

- 3 and 9% of the ships inspected were non-compliant in the Baltic Sea and North Sea respectively (various types)
- The number of fuel samples needs to be increased in order to meet the 30-40 samples per 100 inspections



# Compliance on open sea

- Available data on compliance mainly reflects the situation in port areas
- A typical margin used by inspectorates is 0.5%
- The number of sanctions is still limited (30 %)
- The situation on open seas is still relatively unknown
- Non-compliance is very attractive (~$30,000 per day)
- Danish remote sensing data shows that ships have not continued to use high Sulphur fuel, but the technology is not mature yet

- Recommendations for an increase of intelligence:
  - More (verified) remote sensing/sampling techniques and data needed
  - Coordination of surveillance activities and back and forth reporting
  - Continuous monitoring?

# Outlook to 2020

- As of 2020, ships will be required to use fuels with a sulphur content of 0.5% or less globally. This will change the relative impacts of ECAs:
  - Because the $SO_x$ and PM emissions of all ships will be reduced, the impact of ECAs on $SO_x$ and PM concentrations will be smaller. The impact on $NO_x$ concentration will remain the same.
  - The health benefits will be relatively smaller, but the costs will also be lower because the price difference between 0.1% and 0.5% fuel will probably be smaller than between 0.1% and 3.5%.
  - The impacts on modal shift will be relatively smaller.
  - Enforcement will remain a very important issue.

# Conclusions

- Air quality noticeably improved (50-60%)
- Socio economic benefits outweigh the costs of introduction. This holds if the price difference between fuels will increase again.
- The fuel availability has not been critical
- No modal shifting or economic impacts can be observed on the basis of available data (RoRo), while the economic position weakened
- Rising oil prices may worsen the situation, but the extent is unclear
- 3-9% of ships are non-compliant in the Baltic and North Sea ports
- Various types of non-compliances
- A more intelligent control system requires:
  - Coordination and cooperation of surveillances and control activities
  - Reliable figures on open sea compliance (advanced verified remote techniques)

# Main conclusion of the study

The introduction of the 0.1% sulphur cap in the Northern European SECAs has proven to be an environmental success, without noticeable negative impacts on demand for shipping. Enforcement could be improved.

# Thank you for your attention!

Jasper Faber

faber@ce.nl

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