European Climate Foundation

THE DANISH ECOLOGICAL COUNCIL

Enforcement: The way to cleaner shipping and a fair business

Dr. Kaare Press-Kristensen

Senior advisor on air quality

The Danish Ecological Council

Kaare@ecocouncil.dk

THE DANISH ECOLOGICAL COUNCIL

Benefits of less air pollution

Health benefits ($ per kg saved emission)	SO_2	NO_X	$PM_{2.5}$
Northern hemisphere	17	12	25
North Sea and Baltic Sea	20	15	45

- On top of these benefits come benefits due to less damage on nature, buildings, corps etc.

http://www.ceeh.dk/CEEH_Reports/Report_3/CEEH_Scientific_Report3.pdf

Cost-Benefit

Fuel prices from October in Rotterdam

European SECA:

- Externalities (health costs) SO_2: 20 $ per kg
- Removal costs (Replacing 2.7% S with 0.1% S): (430 $ - 250 $) / 52 kg SO_2 = 3.5 $ per kg

- Every time society invests 3.5 million $ in 0.1 % S fuel instead of 2.7 % S fuel it saves (= earns) 20 million $ just due to less health damage.

THE DANISH ECOLOGICAL COUNCIL

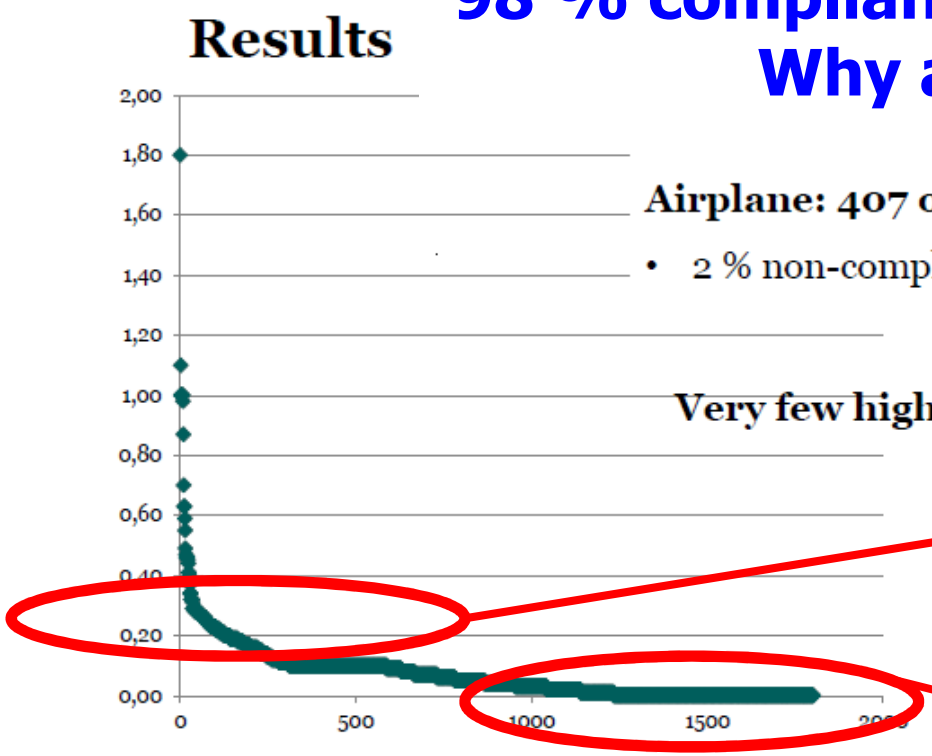
Shipowners' perspective

- A large ship can save about **1,000 $** per hour by not being in compliance.
- The potential saving is **100-200,000 $** by not being in compliance (English channel to Gdansk and back).
- **Is everybody in compliance ?**

Compliance:
Real world data from DK

THE DANISH ECOLOGICAL COUNCIL

98 % compliance !!! Everything is OK !!!
Why are we here ???



Airplane: 407 observations

- 2 % non-compliant (above 0,3 %)

Very few high emitting ships

0.1-0.3 is non-compliance !

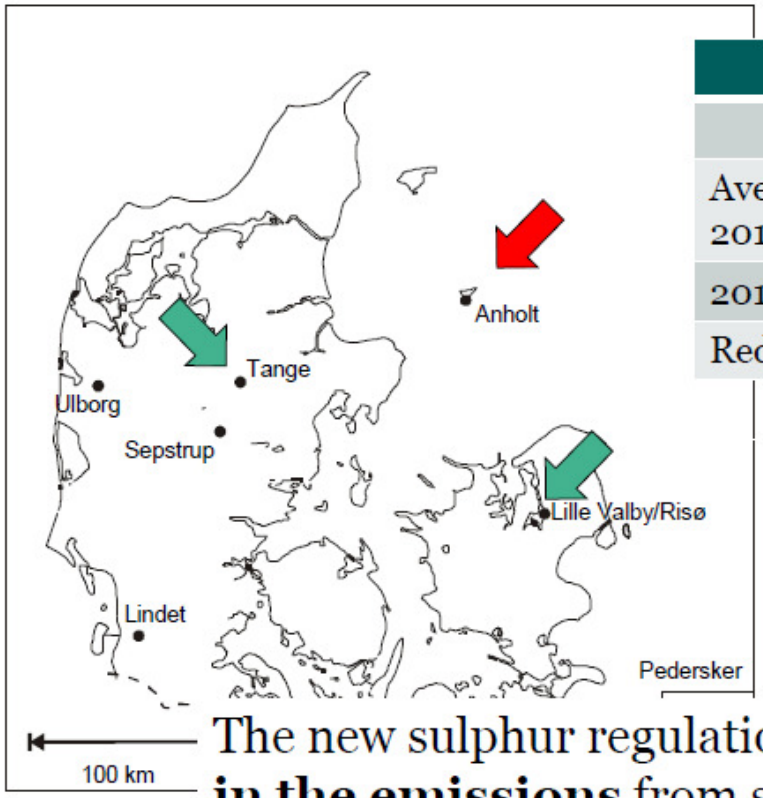
Half of all measurements between 0 and 0.05 % S … Clean ships ??? … No, wrong measurement !!!

High level of compliance!!

70 % compliance …

Measured improvements

SO2 concentration in Demmark



	Anholt	Risø	Tange
	µg/m³	µg/m³	µg/m³
Average 2011-2014*	0,33	0,34	0,22
2015*	0,13	0,18	0,10
Reduction	60 %	47 %	53 %

*) January - May

Danish EPA, 2015

The new sulphur regulation has led to a **reduction in the emissions** from shipping. This has caused a large **reduction in the concentrations**.

Compliance:
Real world data from EU

THE DANISH ECOLOGICAL COUNCIL

- **January to July 2015 (EMSA, THETIS-S):**
  - 3821 inspections.
  - 622 fuel samples.
  - Non-compliance was 6 %.

- **Out of around 400,000 port calls in the EU:**
  - Around 1 % of the ships was inspected …
  - Around 0.15 % of bunker fuel was analyzed …

Enforcement in the EU

- From 2016:
  - 10 % of port calls: Control of log books and fuel notes.
  - 4 % of port calls: Control of the bunker fuel.

  When … December ?

- Fines: Germany: 2,000-5,000 $ and Baltic: 350-2,000 $.
  Norway: 100,000 $, Poland and UK: 60-70,000 $.
  Netherlands: Up to 800,000 $; Belgium: 6M $.

- **Which ports will ship-owners use ?**

Control: Online data

- Measuring devices for SO_2/CO_2 are mandatory for all ships with scrubbers (to prove the efficiency).
- Price: 50-60,000 $ - online measuring data.
- Devices are sealed to avoid manipulation.
- It would be very efficient control to require online SO_2/CO_2 measurements for all ships in SECA ... and on a global level after 2020 (2025).

Penalties: Must be effective

- The chance of getting caught is 4 % in 2016
  → Direct break even is 25 times the saving.
  → The penalties should be several million $.
- The MS's urgently need guidelines for effective penalties ... Deadline for the transposition of the directive and introduction of effective penalties were in June 2014.
- Penalties could (theoretically) as well be detention of violators in nearest port.

THE DANISH ECOLOGICAL COUNCIL

Conclusion

- Reduced air pollution from shipping will provide people longer and healthier lives. And as a whole benefit society from an economical point of view.
- Successful enforcement is needed to realize the environmental benefits of reduced pollution.
- Efficient enforcement consists of efficient control and penalties preventing non-compliance:

  - Efficient control should be online measurements.

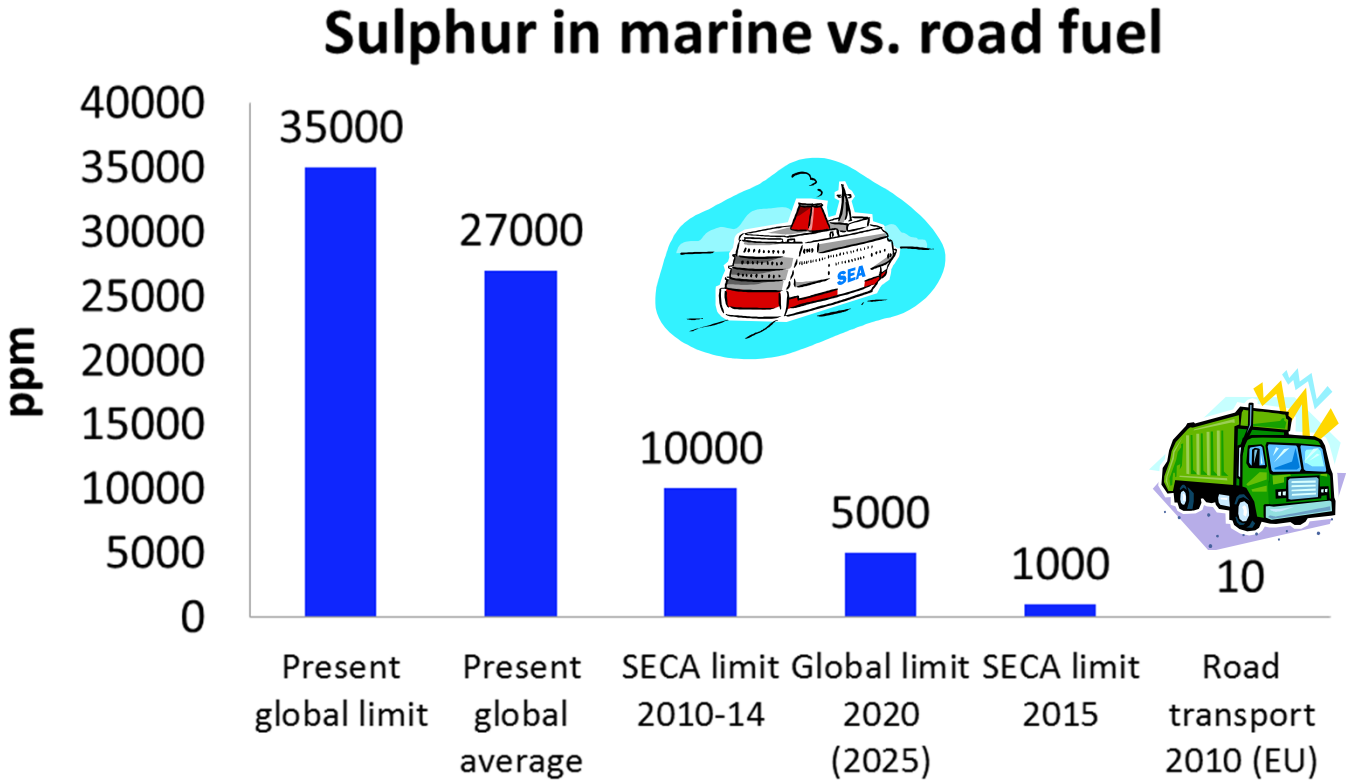
  - We need harmonized effective min. penalties.

The polluter pays principle

- Using 1 ton bunker fuel in the Northern hemisphere emits about 54 kg SO_2, 70 kg NO_X and 1.5 kg $PM_{2.5}$.
- Health externalities 1,900 $ per ton.
- Present price on bunker fuel: 250 $ per ton.
- If shipping companies paid for health damage from air pollution then the price of bunker fuel would be 8-9 times higher than today + other externalities.
- **What would happen if shipping had to pay ?**

THE DANISH ECOLOGICAL COUNCIL

Is shipping regulated too strict ?



New trucks in EU have SCR & particulate filters !

Will regulation sink all ships ?

- If 0.1% S fuel, SCR and filters would double shipping costs.
- What would be the price increase on wine from New Zealand ?
- The price today is 50 kr. Shipping costs is 0.5 kr. If the price on shipping doubles the wine will cost 50.62 kr (incl. 25 % VAT).
- Will I buy less wine ?

Pollutants and adverse effects

	CO_2	$BC/PM_{2.5}$	SO_2	NO_X
Direct health effects		X	(X)	(X)
Indirect health effects			X	X
Acidification (land)			X	X
Acidification (sea)	X		(X)	(X)
Eutrophication (sea)				(X)
Global warming	X	X		

Air pollution from shipping

- Shipping emits around 1 billion ton CO_2 annually i.e. about 3% of the global emission.

2015 estimate (ton)	$PM_{2.5}$	SO_2	NO_X
Northern hemisphere	240,000	1,500,000	3,355,000
North Sea and Baltic Sea	13,000	29,000	955,000
Seas around Denmark	2,500	6,000	173,000
Danish sources (land)	21,000	12,000	125,000

http://www.ceeh.dk/CEEH_Reports/Report_3/CEEH_Scientific_Report3.pdf

Health effects

- Shipping causes almost the same health effects in DK as the sum of all land based emissions in DK.

2015 estimate	Shipping on the Northern hemisphere		Shipping in the North Sea and Baltic Sea	
	DK	Europe	DK	Europe
Years of lost living	4,600	570,000	3,500	140,000
Airway diseases	280,000	32,000,000	225,000	7,900,000
Sick days (B-days)	430,000	50,000,000	350,000	12,600,000

http://www.ceeh.dk/CEEH_Reports/Report_3/CEEH_Scientific_Report3.pdf

Health costs

2015 estimate	Europe (billion $)			Total (billion $)
Health costs related to air pollution from shipping:	SO_2	NO_X	$PM_{2.5}$	
Northern hemisphere	25	41	6	72
North Sea and Baltic Sea	0.6	14	0.6	15.2

http://www.ceeh.dk/CEEH_Reports/Report_3/CEEH_Scientific_Report3.pdf

No efficient NOx regulation …

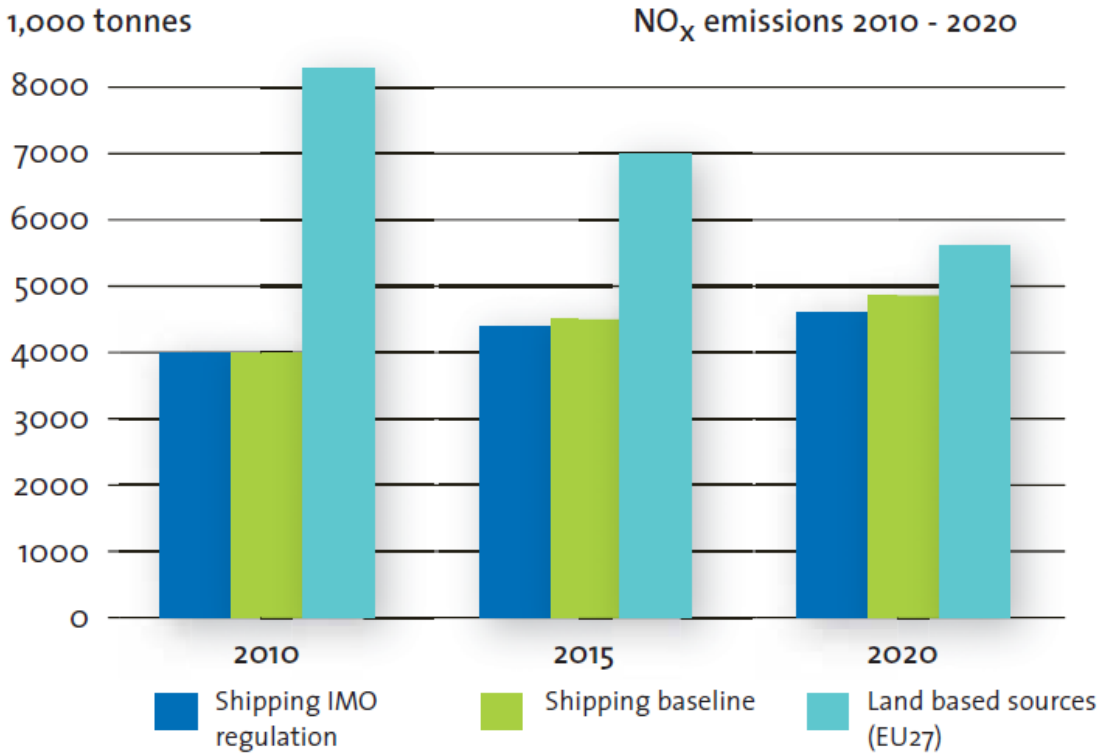


Figure 6: Estimated effect of the IMO regulation on NO_X from shipping in the northern hemisphere. In comparison the baseline (no regulation on NO_X) and the land based emissions in Europe (EU27) are shown.

Reference: The Air Pollution & Climate Secretariat.

NOx causes 50% (Northern hemisphere) and 70% (North Sea and Baltic Sea) of the total health effects !

THE DANISH ECOLOGICAL COUNCIL

How about Sirena Seaways

- Going from Esbjerg to UK since 1875.
- Now the route has been stopped …

- Was this route stopped due to the new sulphur regulation as claimed by some interests ?
- Or was it the drop in passengers from 300,000 to 80,000 per year … as a result of many low price flights and the stop of tax-free sale …