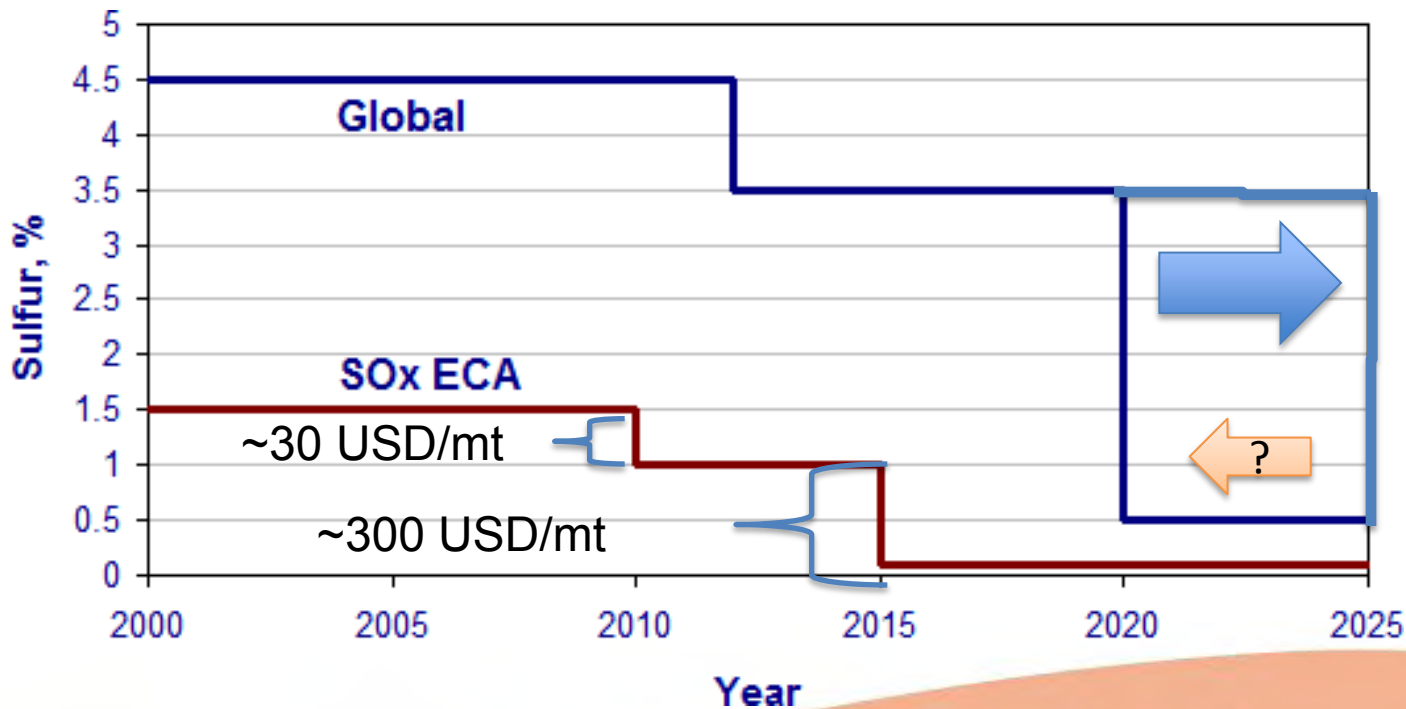


Helikopteriperspektiivi rikkidirektiivin ympäristövaikutuksiin, kustannuksiin ja niiden lievennyskeinoihin

Dr. Tapani Stipa



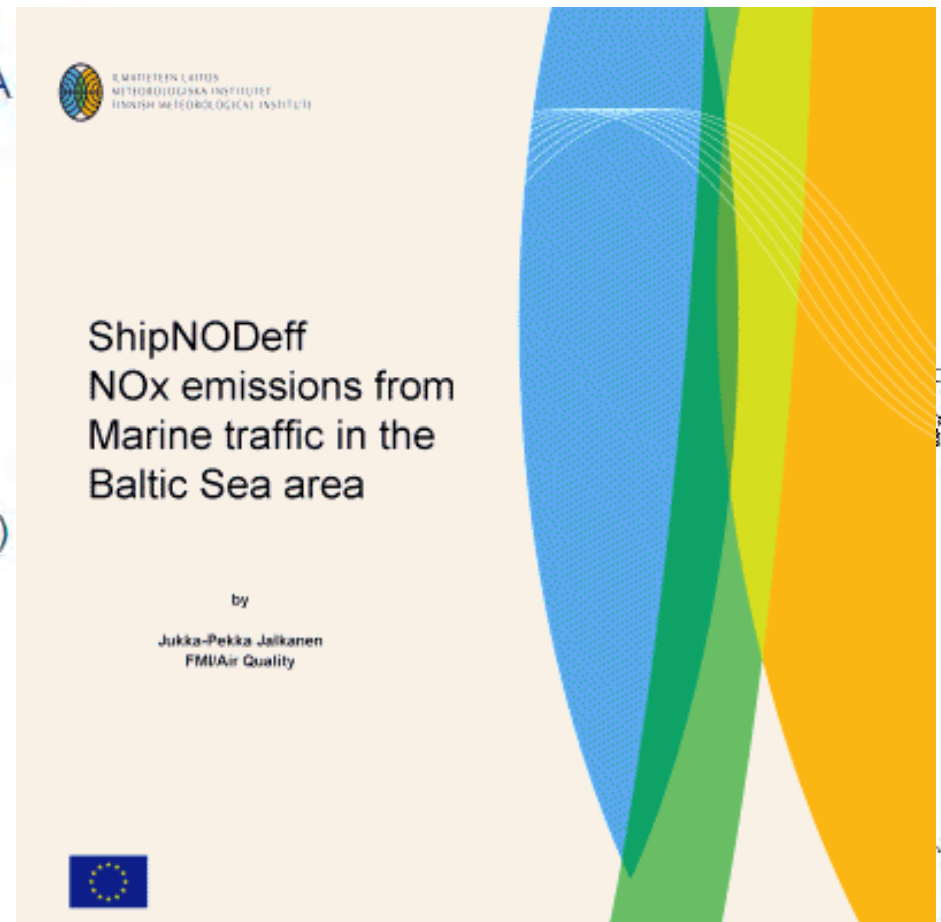
IMO sulphur limit implementation



Northern Europe's SECA

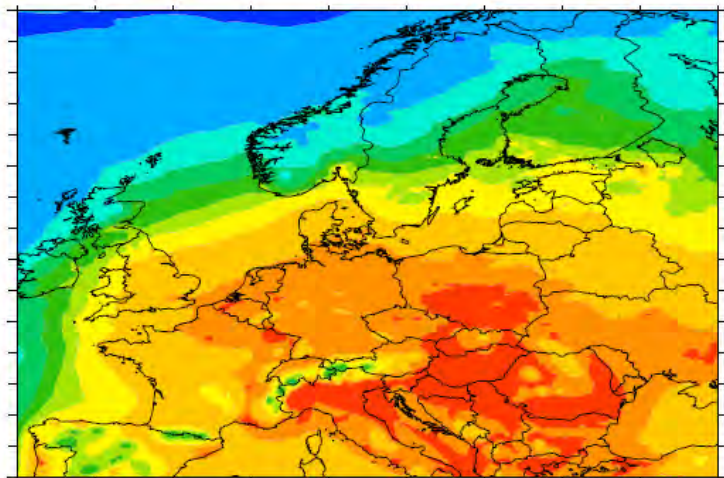
- IMO Marpol Annex VI

- SOx emission control area, SECA
- Baltic Sea shipping: Fuel consumption 5.7 million tons (2009)
- North Sea shipping: Fuel consumption 9.7 million tons
- Total 15.4 million tons
- Commercial shipping 13 million tons (12 290 ships, 13 ship types)
 - Ro-ro
 - Ropax
 - Product tanker
 - Container
 - Chemical tanker
 - General cargo
 - Vehicle carrier
 - Crude oil tanker
 - Bulk ship
 - LPG tanker
 - Cruise ship
 - Reefer
 - LNG tanker

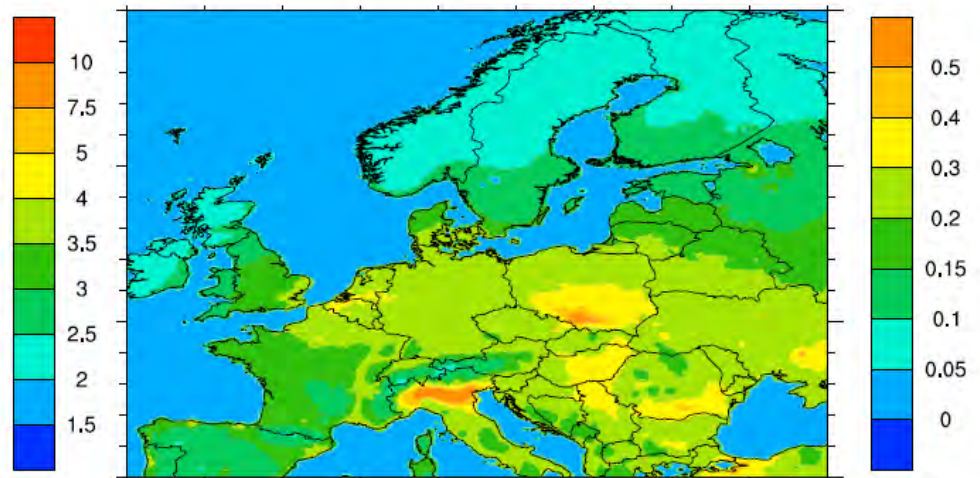


Ympäristövaikutukset

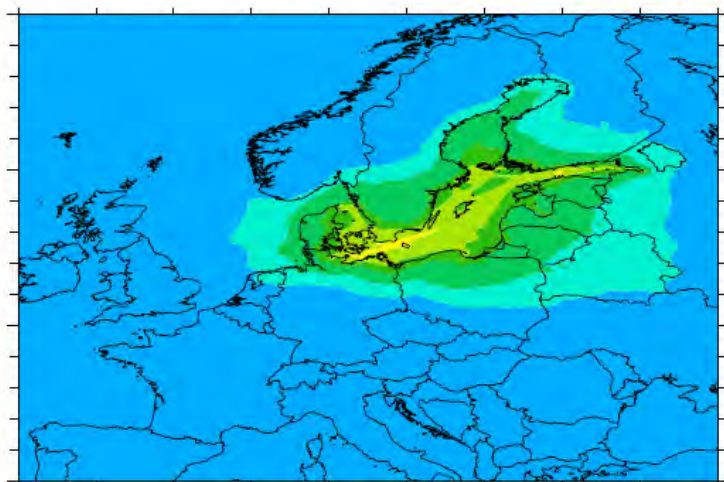
- Rikkidirektiivin vaikutus lähinnä terveyteen
- Polttoaineen rikkipitoisuus vaikuttaa hiukkaspäästöihin
- Pienhiukkaset tunkeutuvat keuhkojen kautta elimistöön lyhentäen elinikää



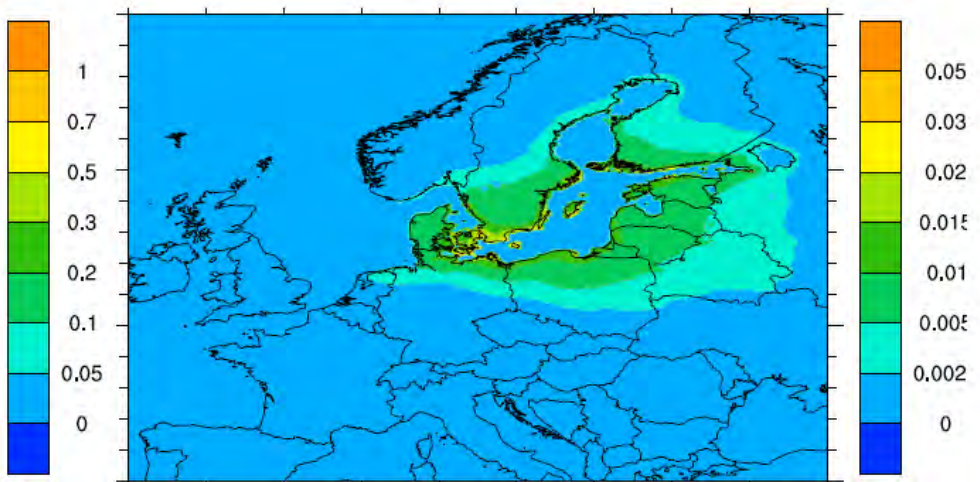
a) PM2.5 in μgm^{-3}



b) YOLL

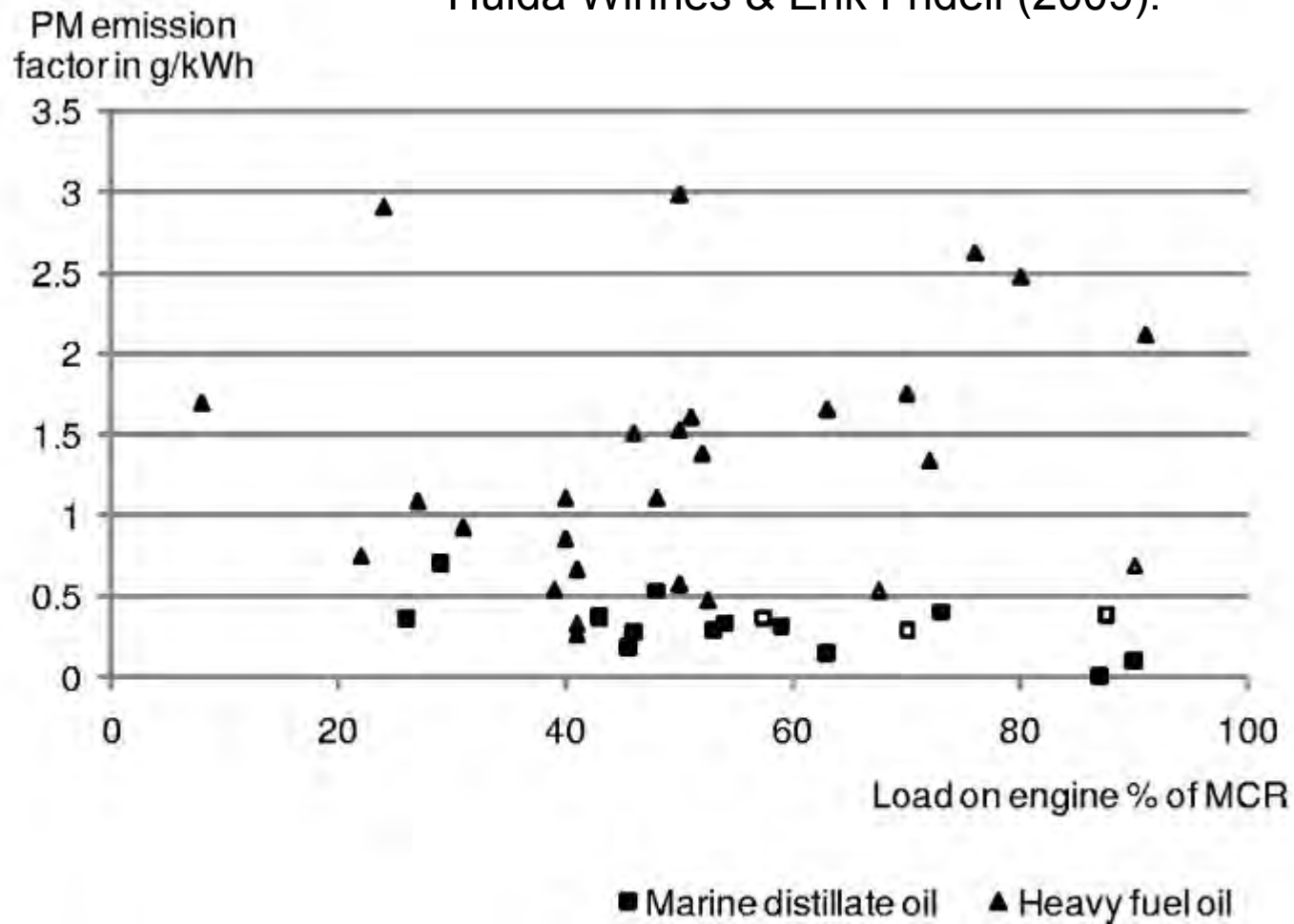


c) PM2.5 from Baltic shipping

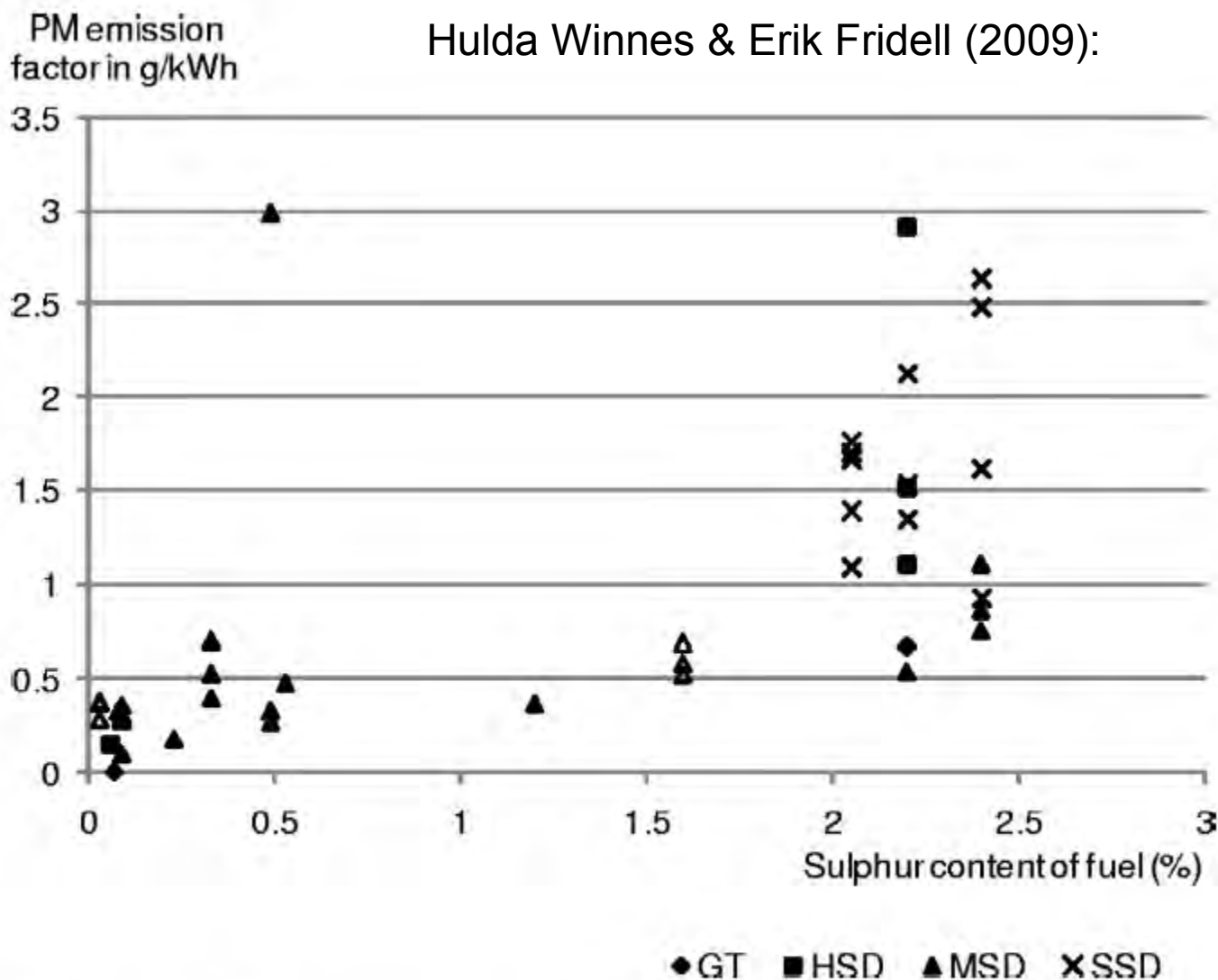


d) YOLL from Baltic shipping

Hulda Winnes & Erik Fridell (2009):

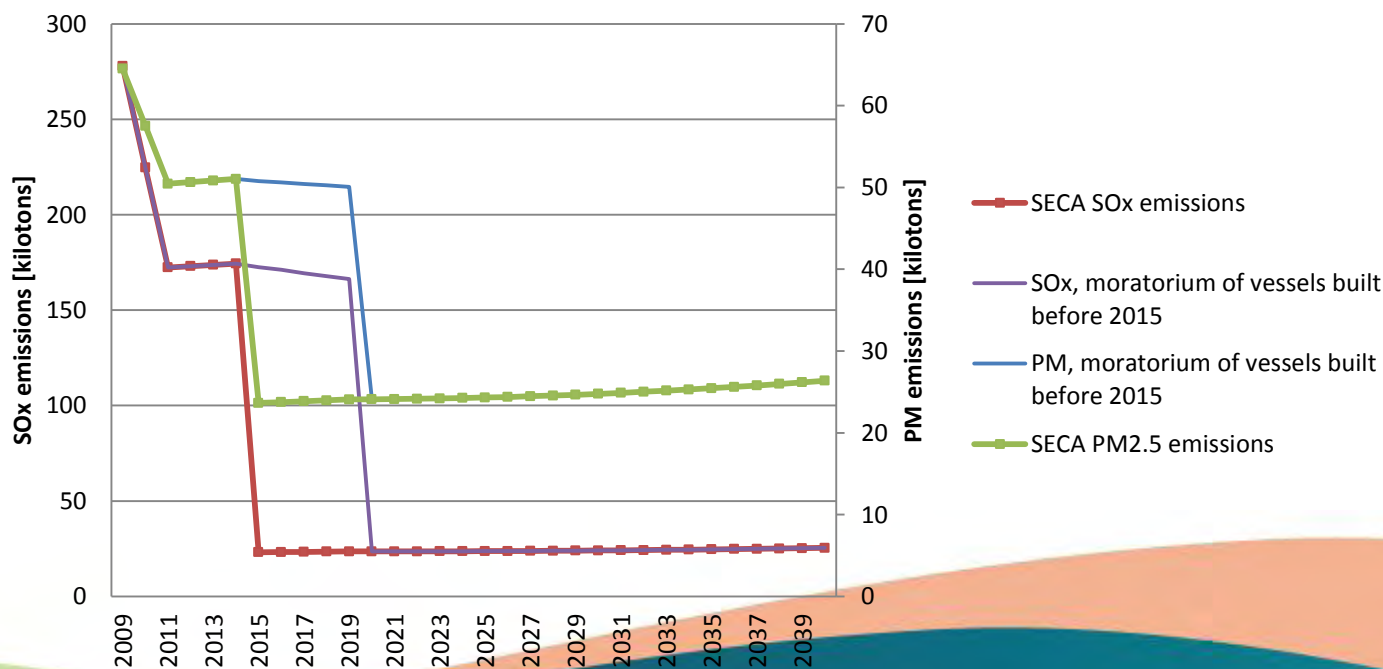


Hulda Winnes & Erik Fridell (2009):



SOx ja PM skenaario

SOx and PM, European SECA, until 2040 (in 2015 1.0%-S to 0.1%-S)

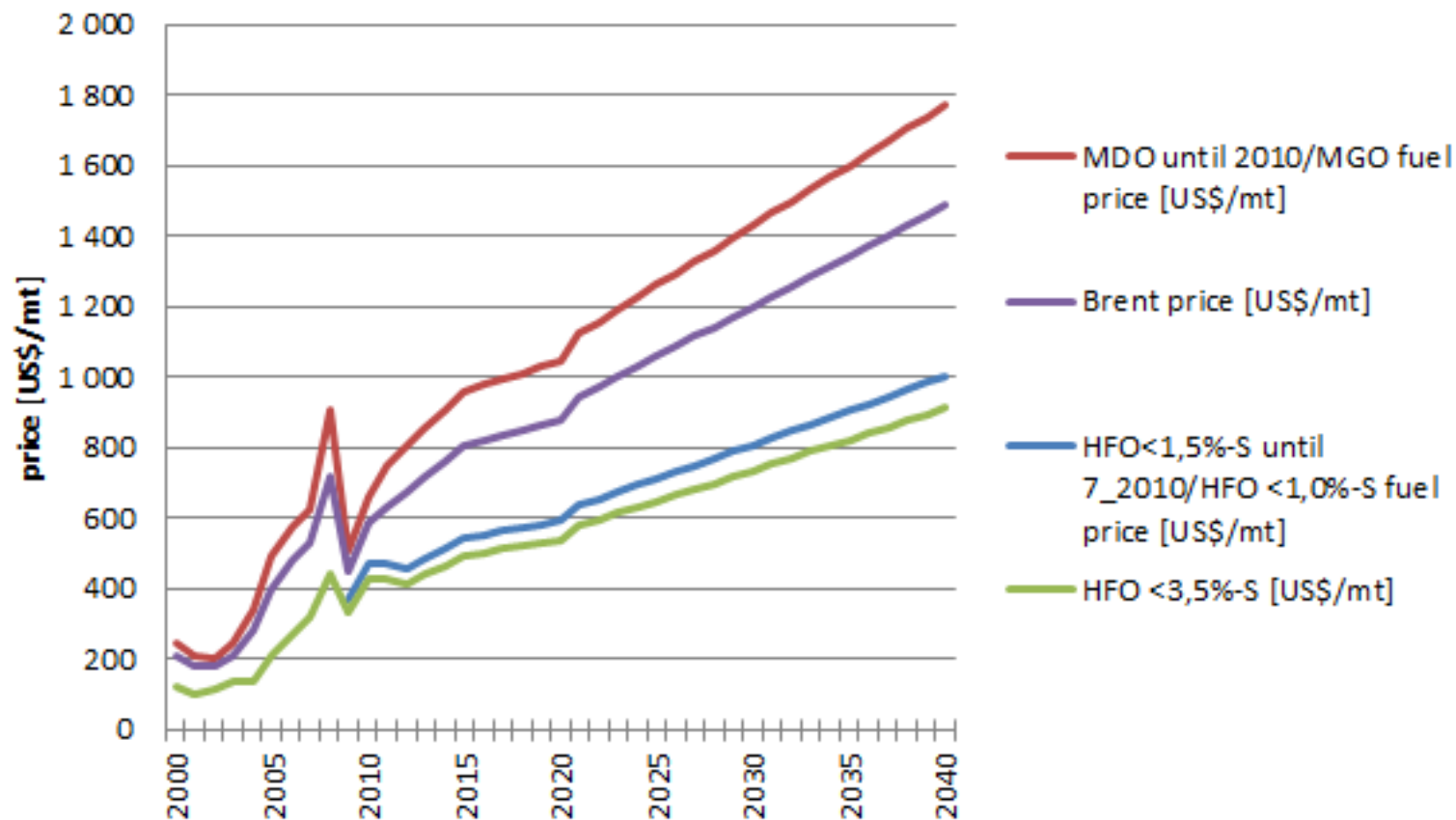


Kustannukset

- Pohjanmeri-Itämeri alueen liikenteelle
- Arvioitu tässä vaihtoehtoiskustannuksena HFO-MGO
- Tämän päivän hintaero n. 300 USD/tn

Expected fuel price development

Ship fuel prices [US\$/mt]



MARPOL Annex VI additional costs

- Additional costs due to fuel switch (HFO → MGO) *today prices*

= (SECA fuel consumption) * (assumed share of HFO) * (Distillate vs. HFO price difference)

= 15.7 million tons/year * 0.85 * 294\$/ton = **3.9 billion \$/year**

Price difference between MGO and HFO will increase in the future!

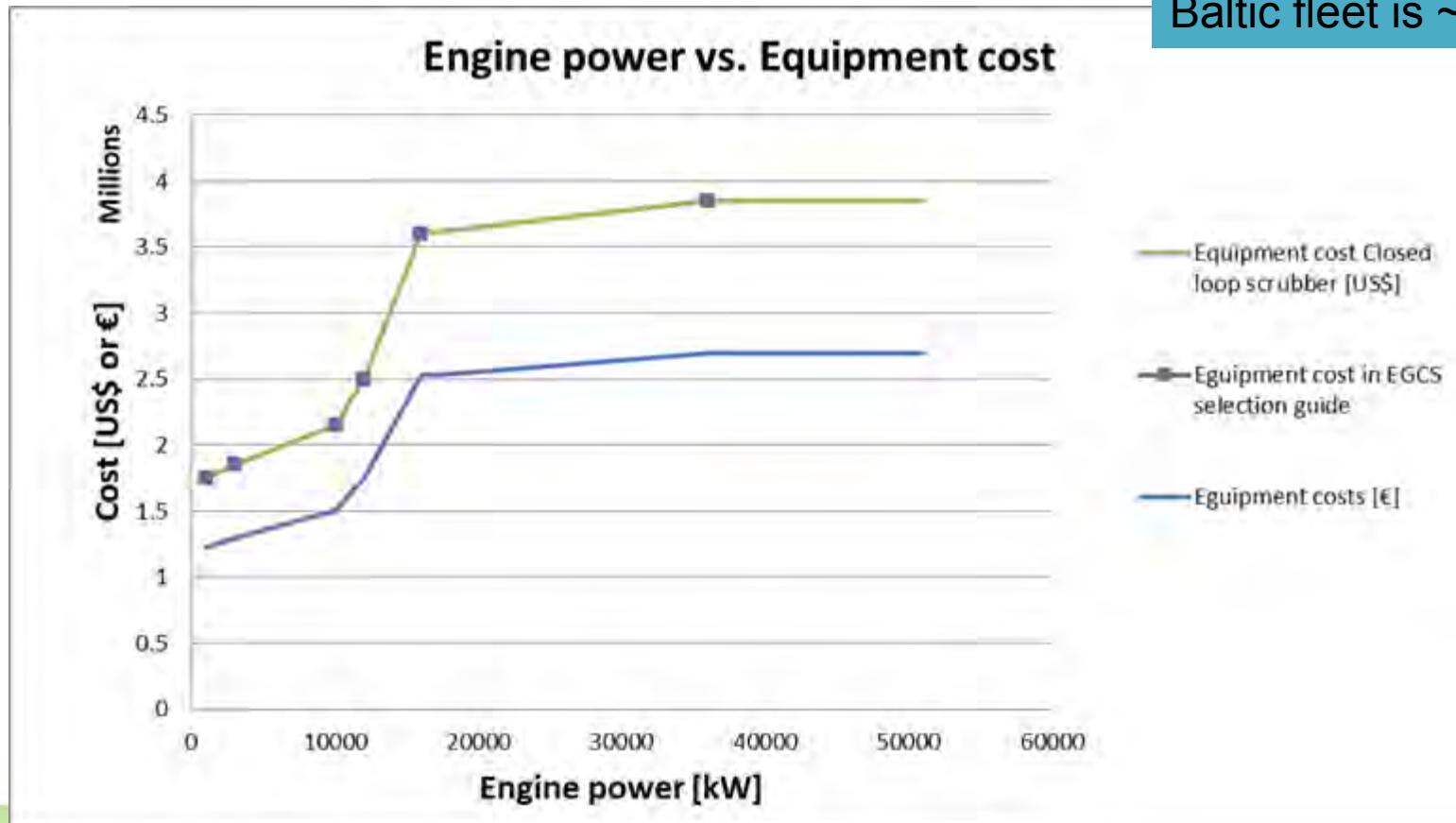


Vähennyskeinoja

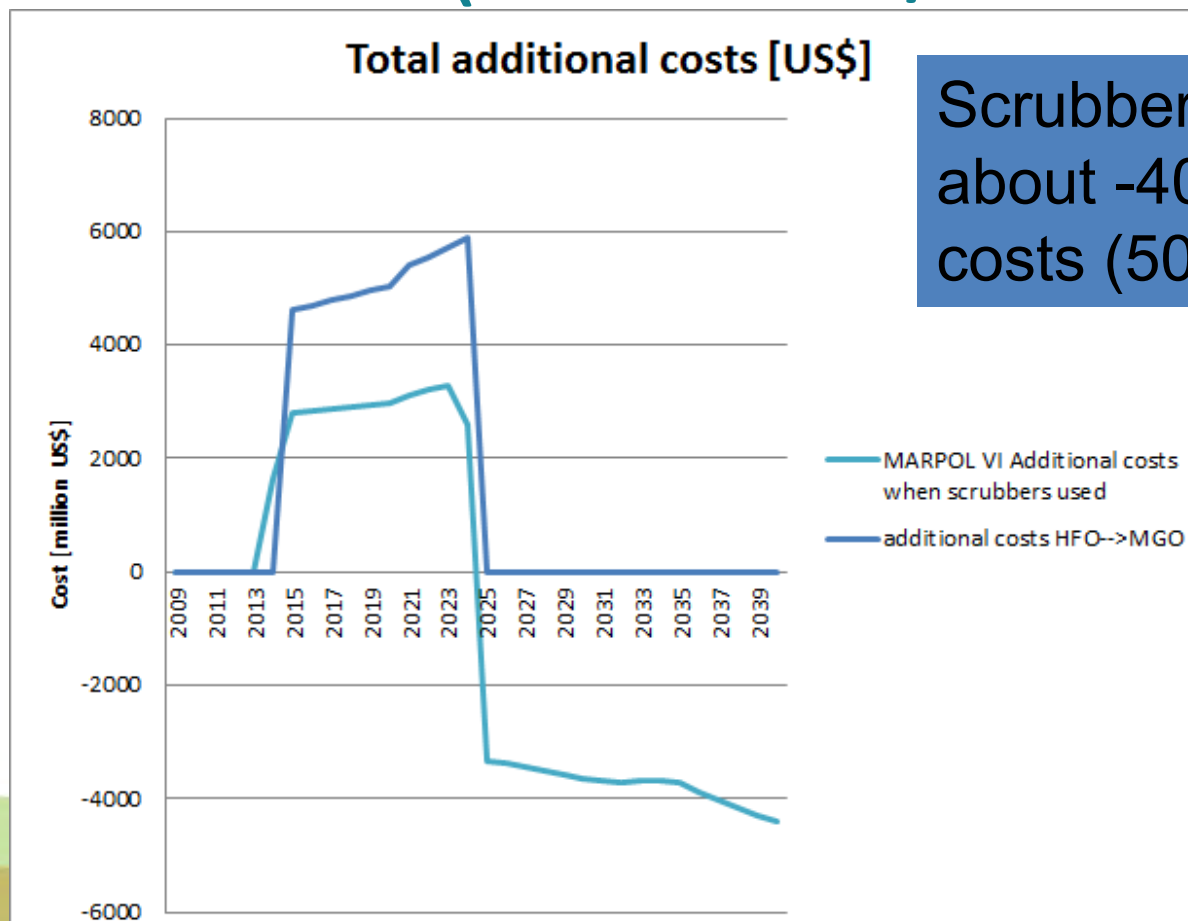
- Pakokaasupesurit
- Modaalimuutokset
- Suuruuden ekonomia
- LNG
- Level playing field

Scrubber cost

NB: average age of
Baltic fleet is ~20 years

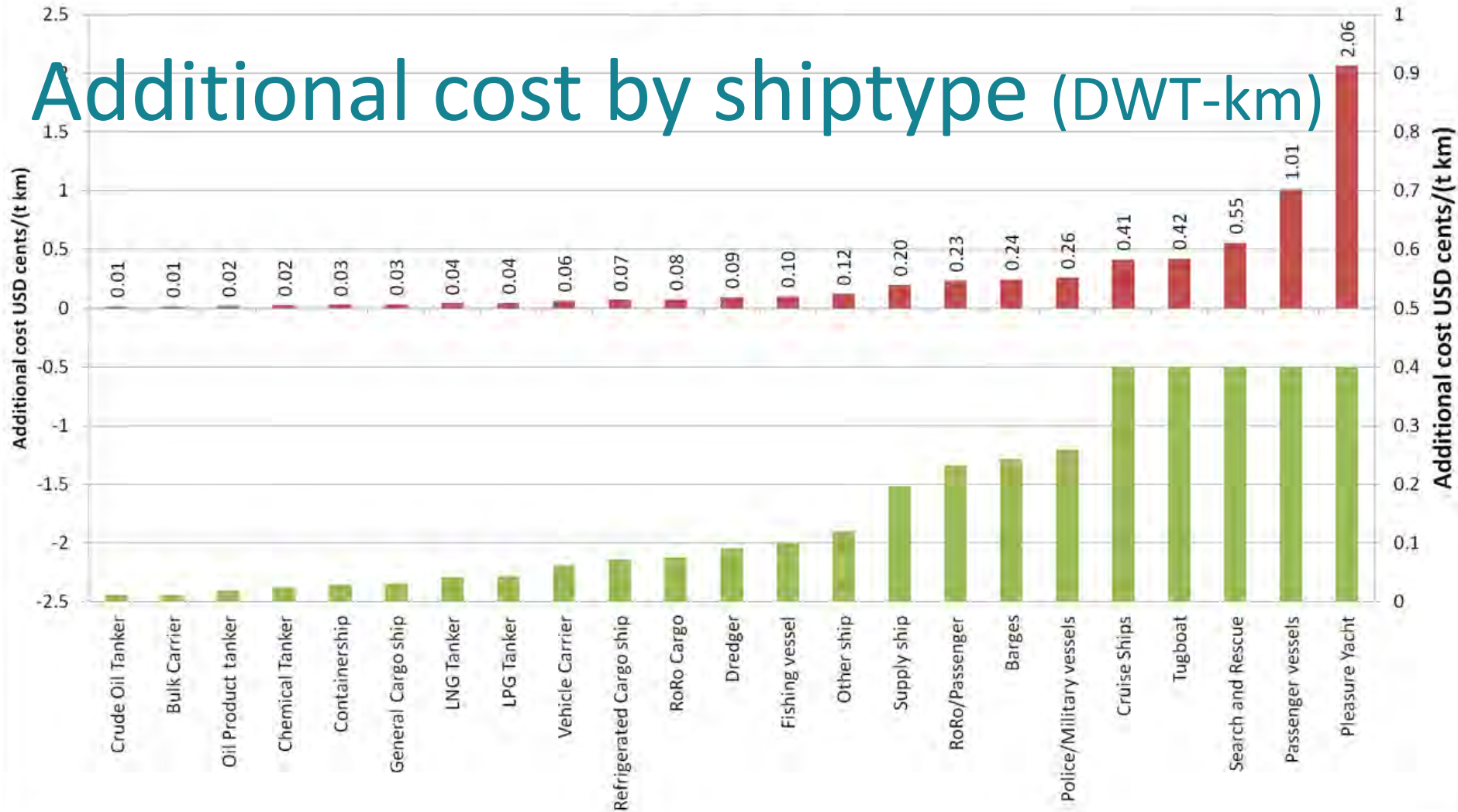


Costs reduction potential of scrubbers (see BTJ 2/2012)

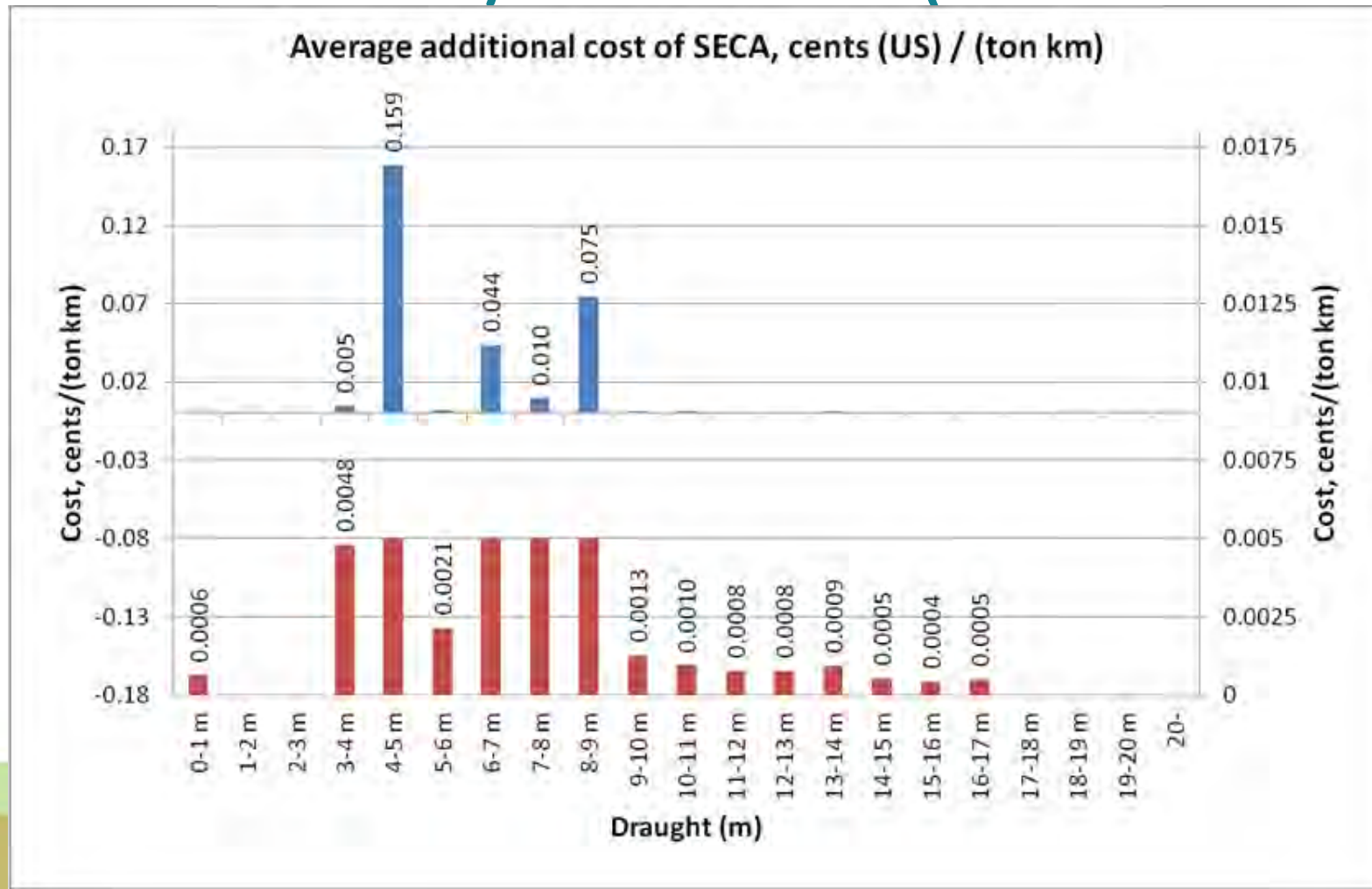


Scrubber potential is about -40% of additional costs (500-1000 vessels)

Additional cost of SECA fuel switch (HFO->MGO, in USD cents/(ton km)) by shiptype, North Sea, September 2011



Add. Cost /DWT-km (Container v.)



LNG

- Useita terminaaleja suunnitteilla
- Tornio aloittanee jakelun 2016
- Ratkaisee monta ongelmaa samalla kertaa
 - Ei SOx päästöjä
 - PM päästöt vähäisiä
 - CO2 päästöt vähenevät
 - NOx päästöt vähenevät
- Hinta jopa HFO:ta edullisempi, suuria hintaeroja
- Hyvä ratkaisu niille jotka siihen voivat siirtyä



Level playing field



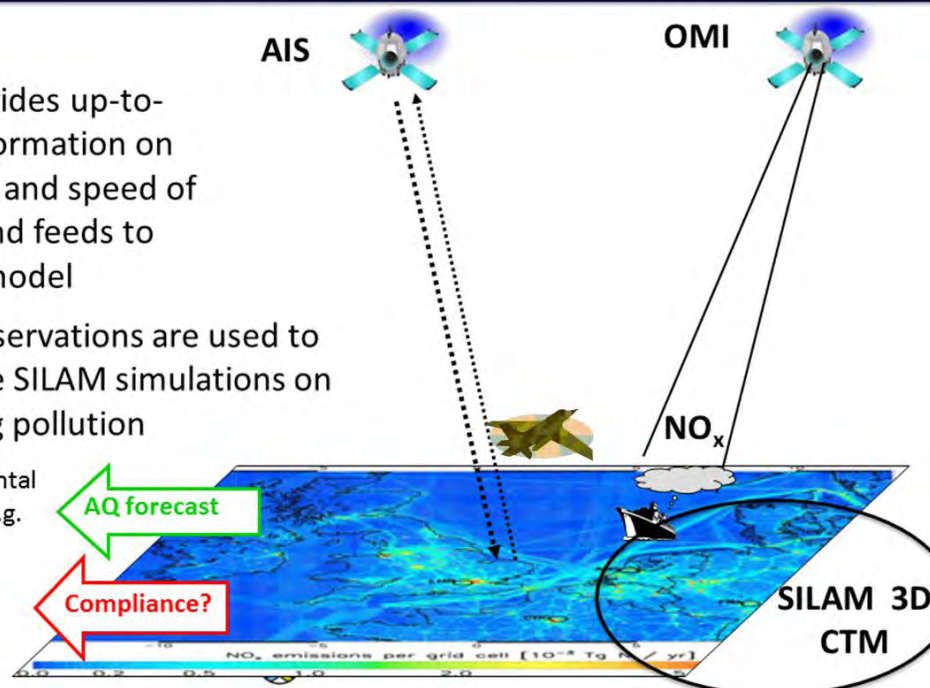
SAMBA overview

AIS provides up-to-date information on location and speed of ships, and feeds to SILAM model

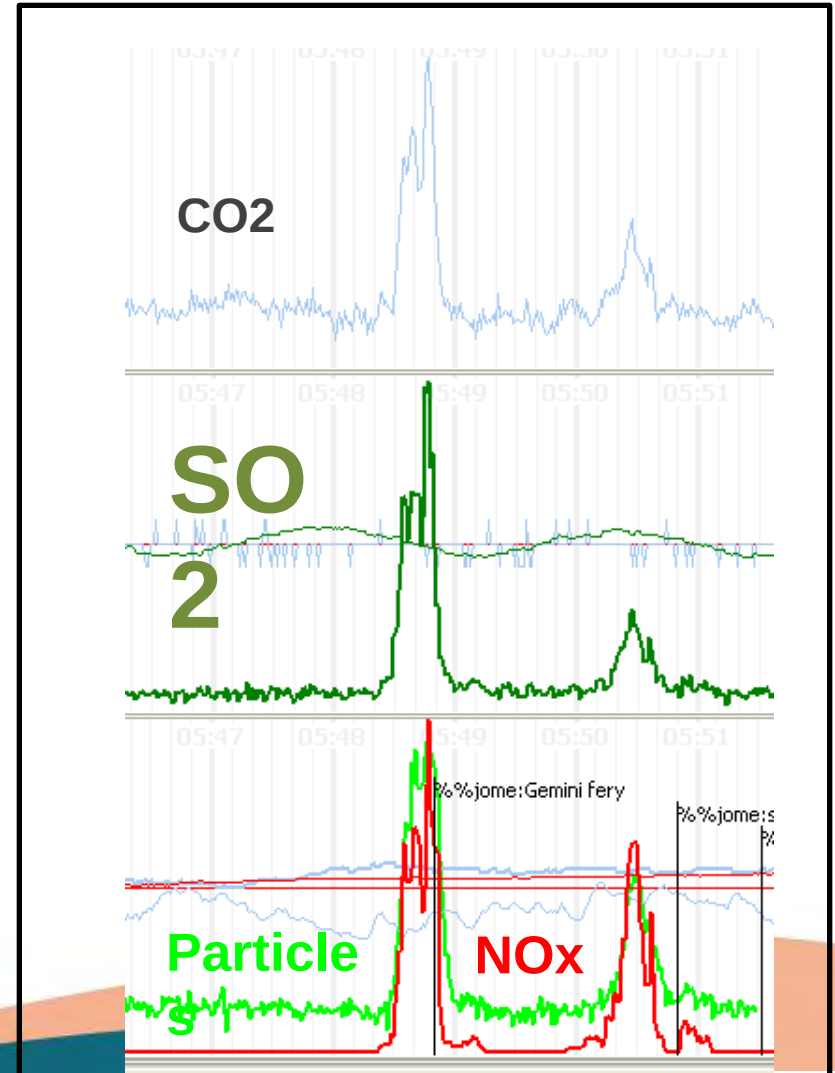
OMI observations are used to evaluate SILAM simulations on shipping pollution

Environmental agencies (e.g. DCMR)

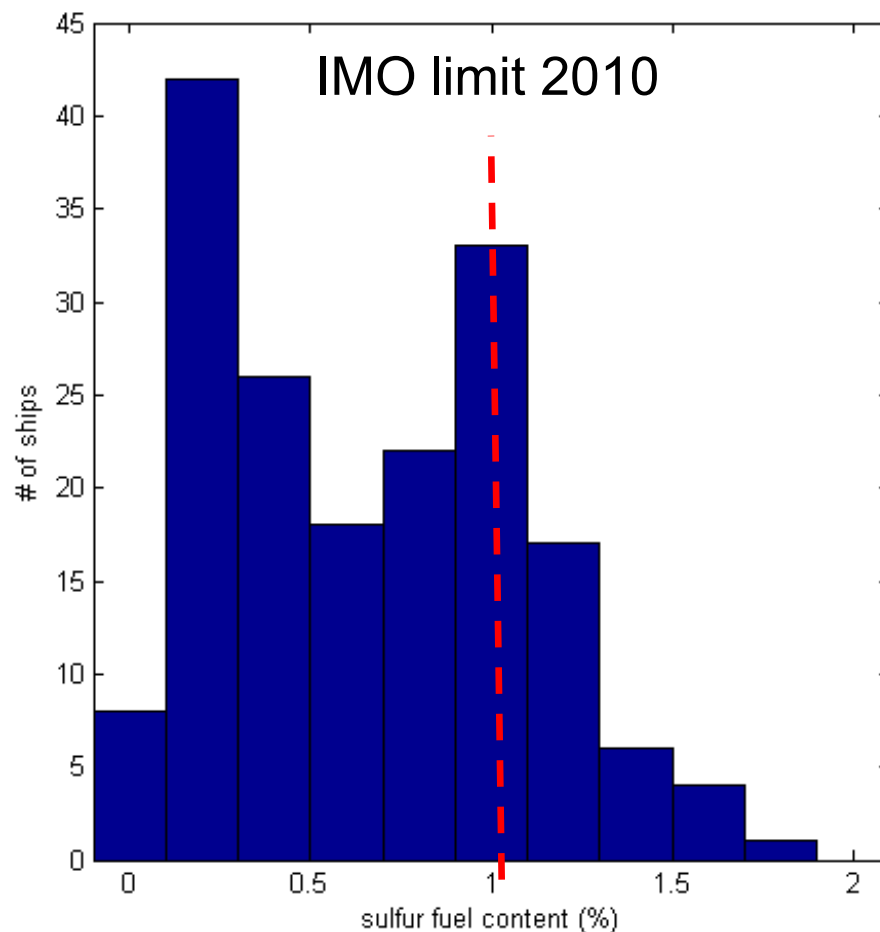
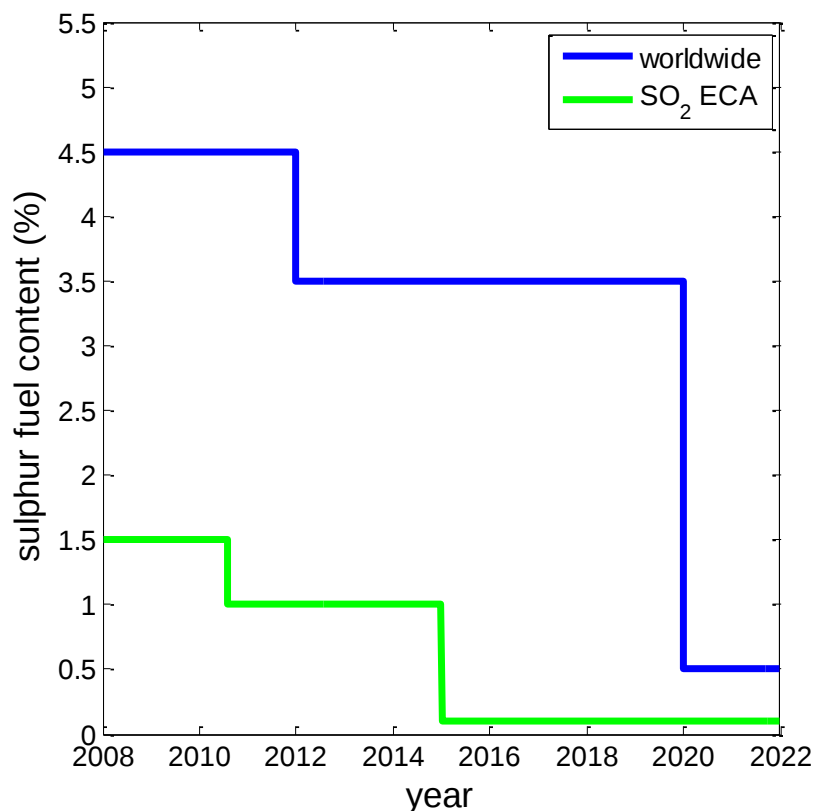
National maritime authorities, EU



Sniffer Method



Sulfur fuel content for ships measured in the Neva bay 2011 from the harbor vessel Redut



Yhteenveto

- Rikkidirektiivin kustannukset 4-6 bn USD/y (Pohjanmeri ja Itämeri)
- Vähennyskeinot edellyttävät muutakin kuin HFO-MGO vaihdon
- Myös valvonta täytyy järjestää