

Jaarcongres 2009



KIVI NIRIA

# Hup Holland Hub



**Maritieme  
Duurzaamheid**

Donderdag 26 november 2009 - RDM Campus in Rotterdam

Jaarcongres 2009



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# **Hup Holland Hub**

Maritieme Duurzaamheid

“Schone Schepen in Perfecte Storm”

H. van den Boom – MARIN

“E-3 Tug”

J. Mathôt – Damen Shipyards

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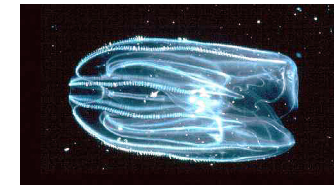
### CO2 output from shipping twice as much as airlines

- Maritime emissions not covered by Kyoto accord
- Studies suggest 75% rise in 15 years as trade grows

John Vidal, environment editor  
The Guardian, Saturday March 3 2007  
[Article history](#)



90% of the world's goods are carried by sea and world trade is increasing all the time. Photograph: Macduff Everton/Corbis



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© Arne Naevra (Norway)

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- Internationale zeescheepvaart 2007:
  - 843MT CO<sub>2</sub>=2.7% van de mondiale uitstoot

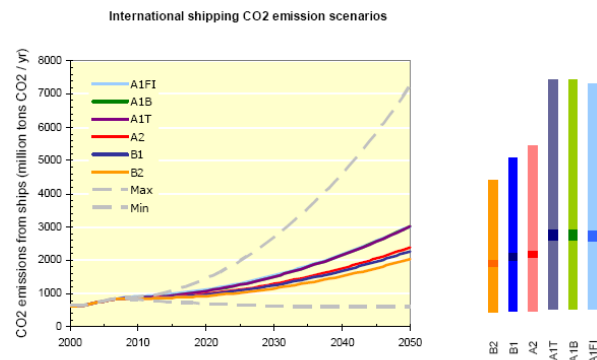


Figure 1-2 – Trajectories of the emissions from international shipping. Columns on the right-hand side indicate the range of results for the scenarios within individual families of scenario

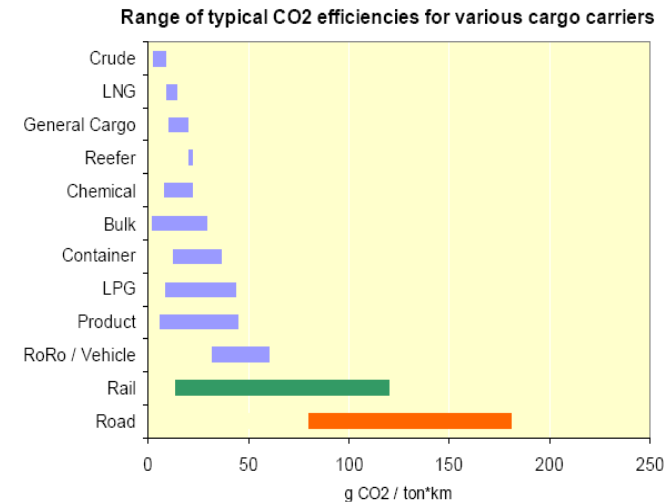


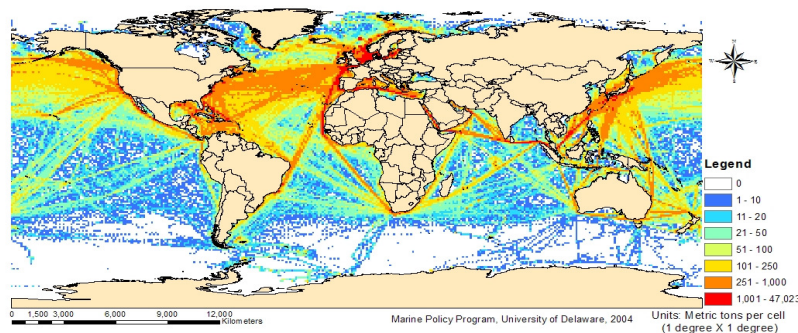
Figure 1-3 – Typical ranges of CO<sub>2</sub> efficiencies of ships compared with rail and road transport

$$\frac{\left( \prod_{j=1}^M f_j \right) \left( \sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)} \right) + (P_{AE} \cdot C_{FAE} \cdot SFC_{AE} *) + \left( \left( \prod_{j=1}^M f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AEeff(i)} \right) C_{FAE} \cdot SFC_{AE} \right) - \left( \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME} \right)}{f_i \cdot Capacity \cdot V_{ref} \cdot f_w}$$

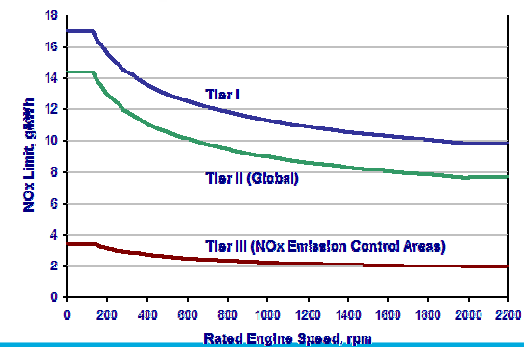
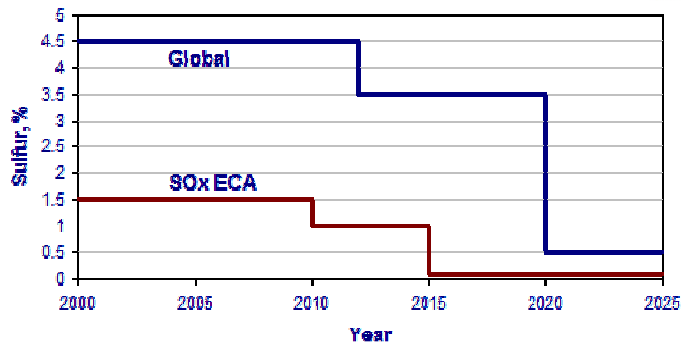
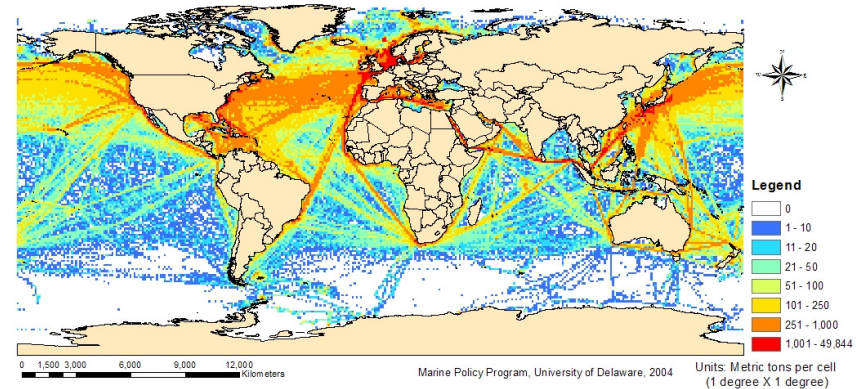


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SOx Emissions from Ships for 1997



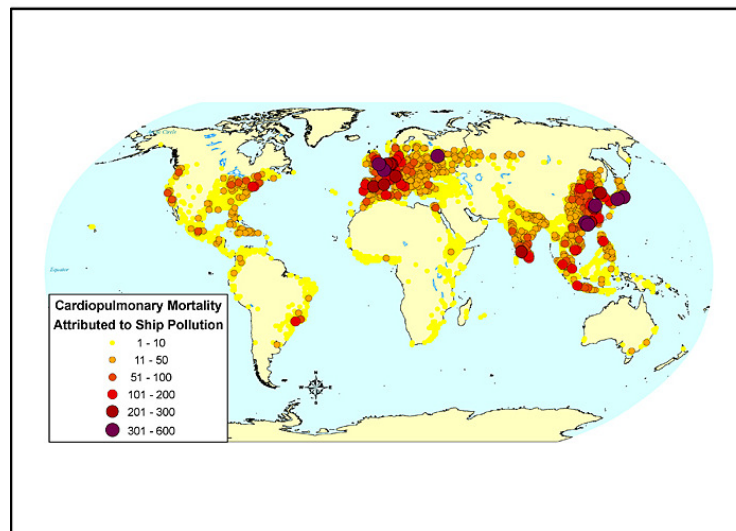
NOx Emissions from Ships for 1997



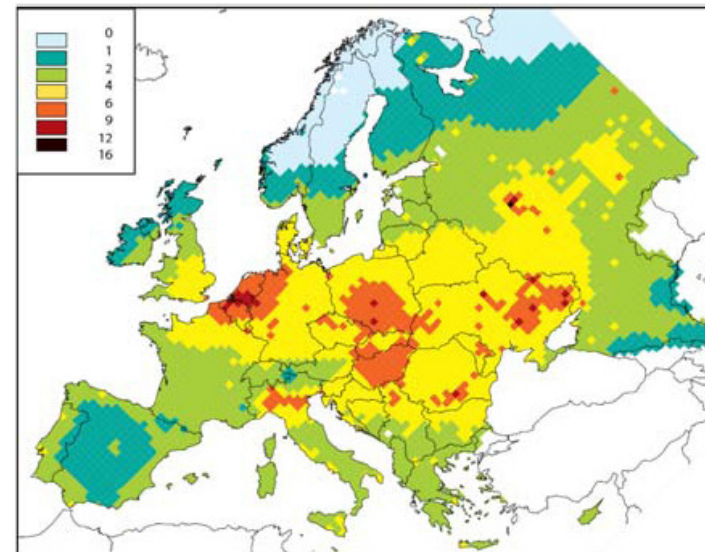


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### Particulate Matter



Cardiopulmonary mortality attributable to ship particulate matter emissions worldwide.



Loss of life expectancy (months) due to anthropogenic sources of PM<sub>2.5</sub> for the "Baseline" scenario in 2020

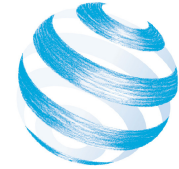


## **Hup Holland Hub**

Uitdagingen:

- Scheepsbouw en systeem technologie
  - Energiebesparing
  - Alternatieve brandstoffen
  - Walstroom
  - Pre- en aftertreatment systemen
  - Hybride technologie en systeemintegratie
  - Energie management
- Infrastructuur
- Business modellen
- Regelgeving m.b.t. technologie

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