Required future efficiency of container vessels to meet emission targets

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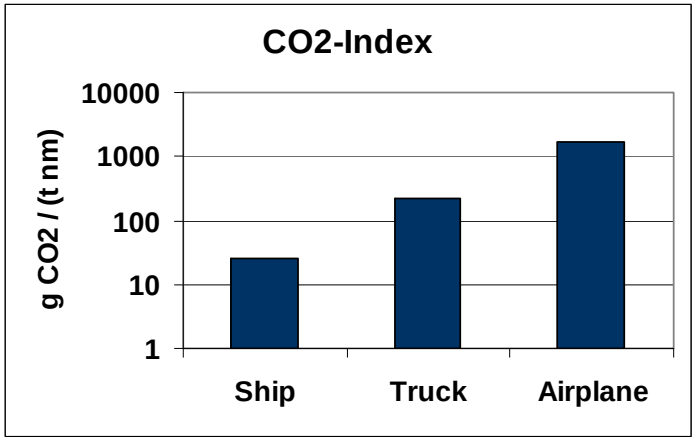
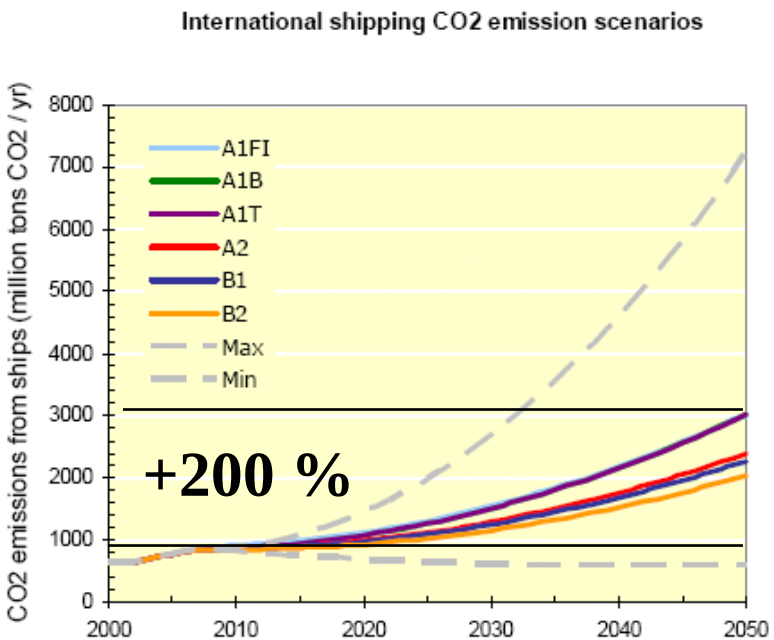
Introduction

- Shipping is the most energy efficient mode of transport.
- Expected CO_2-emissions from shipping have been documented in the second IMO GHG inventory study (1).
- Shipping will need to massively increase the energy efficiency of the fleet to match expected transport growth with CO_2-emission targets.

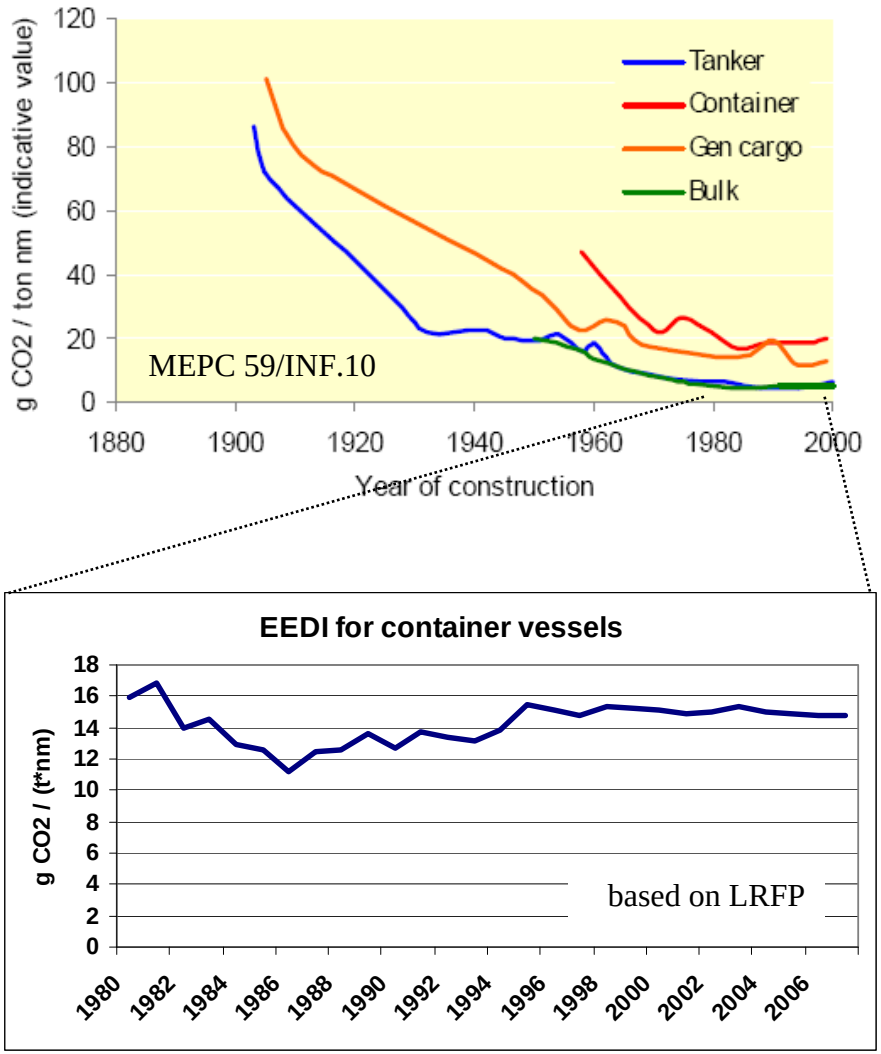




1) MEPC 59/INF.10

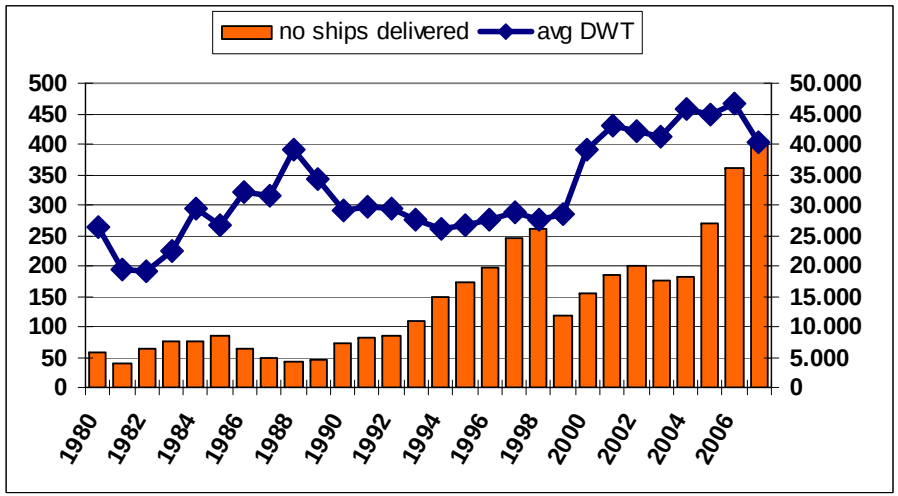
Historic energy efficiency of container vessels

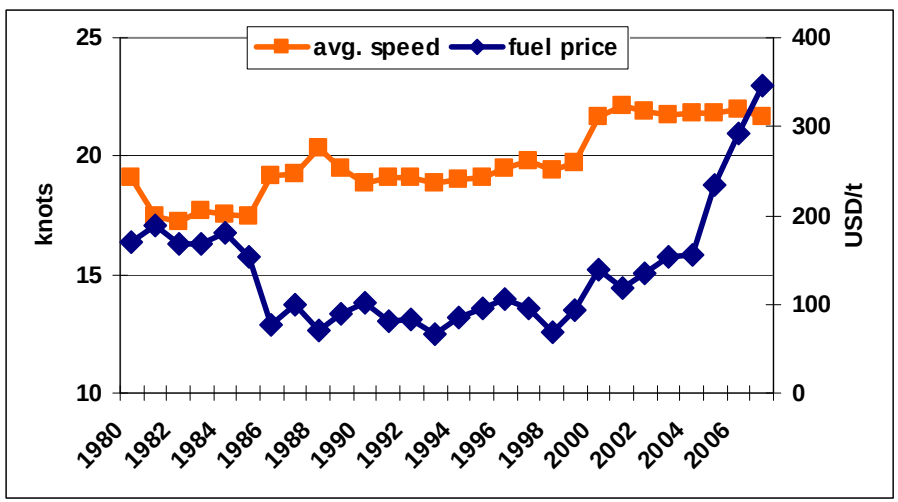
- Recorded energy efficiency of major ship types has stagnated over the last two decades.
- Using LRFP data, the EEDI for all container vessels delivered from 1980 to 2007 was computed using the simplified “baseline” formula. We averaged the figures per year.
- For container vessels, energy efficiency gains in the 1980s – following the oil crisis – were lost afterwards.
- This happened when engine specific fuel consumption continuously decreased.



Why did EEDI not improve in the past?

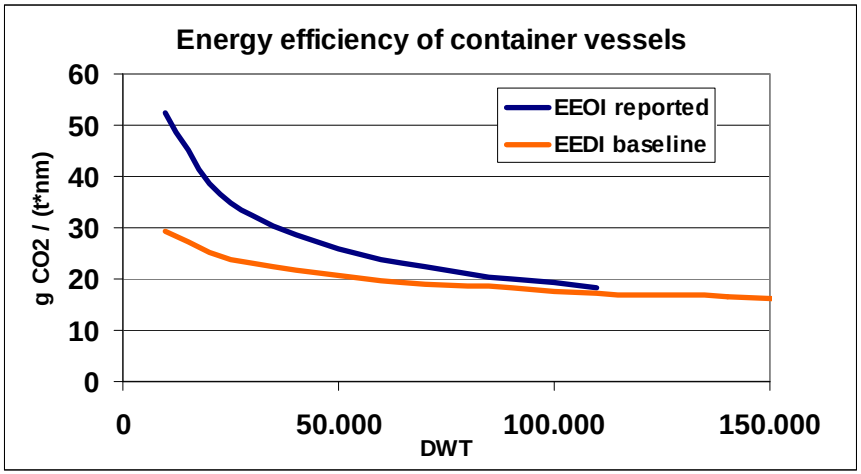
- The container fleet grew rapidly since 1990. The average vessel size grew moderately.
- The transport work done and the associated CO_2-emissions grew in line with the fleet and the vessel size.
- Average vessel speed increased from 17.5 knots (1986) to 21.6 knots (2007).
- The low fuel price from 1986 to 2000 supported neglecting energy efficiency. Only with recent high fuel prices, interest in energy efficiency returned.

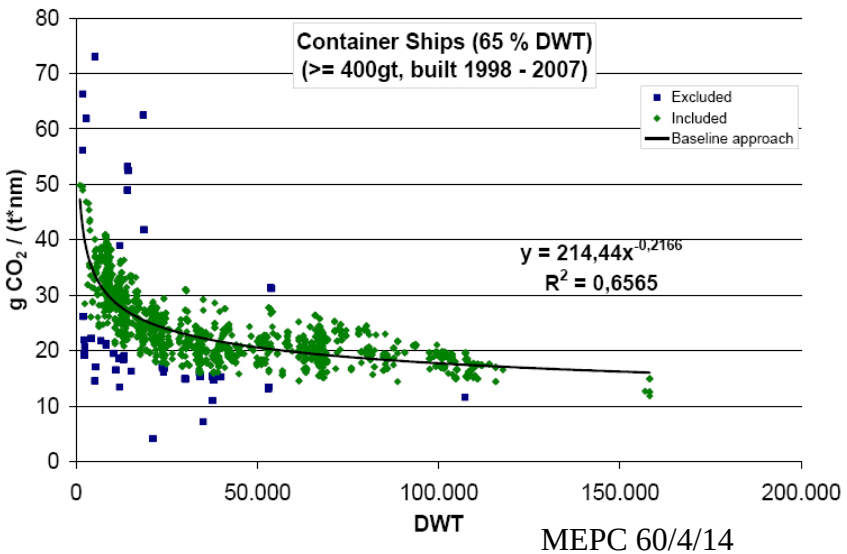




Present energy efficiency of container vessels

- GL offers voluntary reporting of EEOI (former CO_2-index) since 2007. In 2008, GL also introduced certification of the CO_2-index.
- A trend line based on reported operational data has significantly higher value than the EEDI for smaller vessels. This underlines the variety among one ship type for small DWT sizes.
- A similar spread is observed for the EEDI computed for recently built vessels.





MEPC 60/4/14

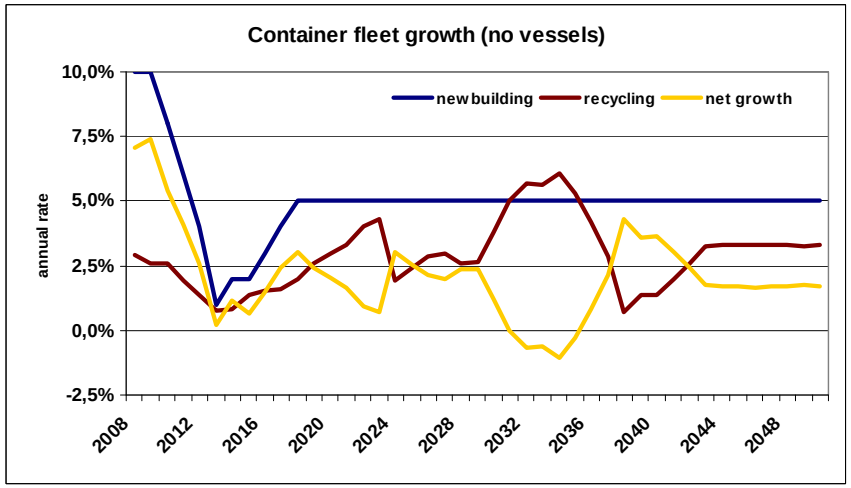
Future emission target for shipping

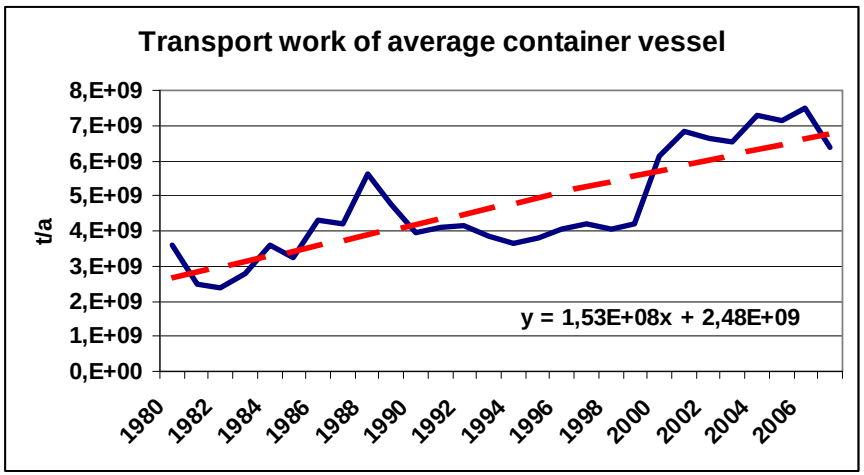
- There is no emission target set for shipping (yet).
- The EU parliament agreed to propose an emission target for shipping to the Copenhagen conference

  -20% from 2005 in 2020
- The EU proposal was only discussed in a working group at COP 15. No records of the discussion are available.
- In addition, this proposal was only recently questioned by EU member states.
- GL expects for the shipping sector a target similar as for developed countries.
- The EU-proposal is taken for this study as reference.
- There is no emission target discussed per ship type (yet).
- We break down the shipping target to derive a target for container vessels in this study.
- Recorded emissions from int. shipping in 2005 (MEPC 59/INF.10): 795 mt / y
- Share of emissions from container vessels in 2007 (MEPC 59/INF.10): 25.8%
- Emissions from container vessels in 2005: 205 mt / y
- Emission target for container vessels: -20% from 2005 in 2020: 164 mt / y

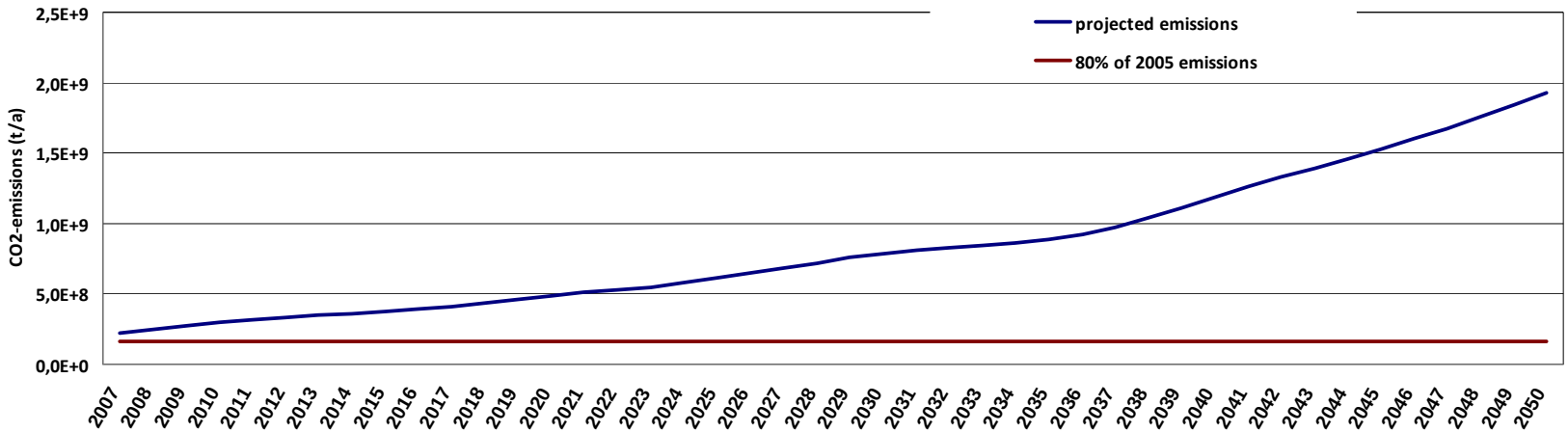
The container fleet growth model

- The emission prediction is based on a fleet of vessels which evolve over the years.
- Each year, old vessels (those with an age of 25 years) are removed and new vessels join at a rate of 5% from 2018 onwards (= half the historic rate).
- The assumed growth in transport work per average vessel is 3%, half the rate from historic data.



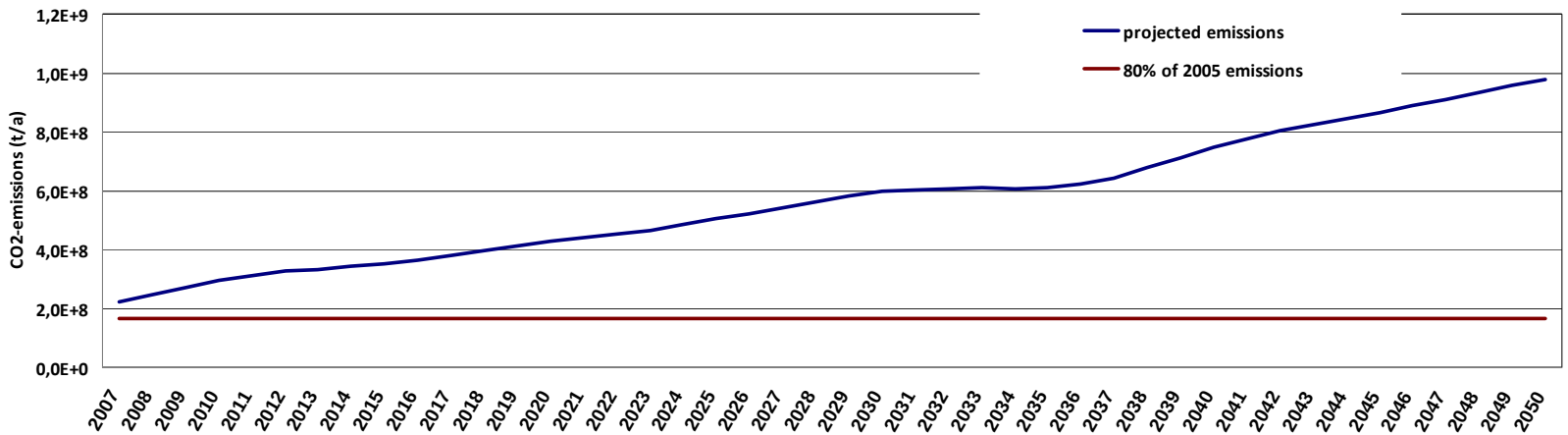


The base case – no improvements



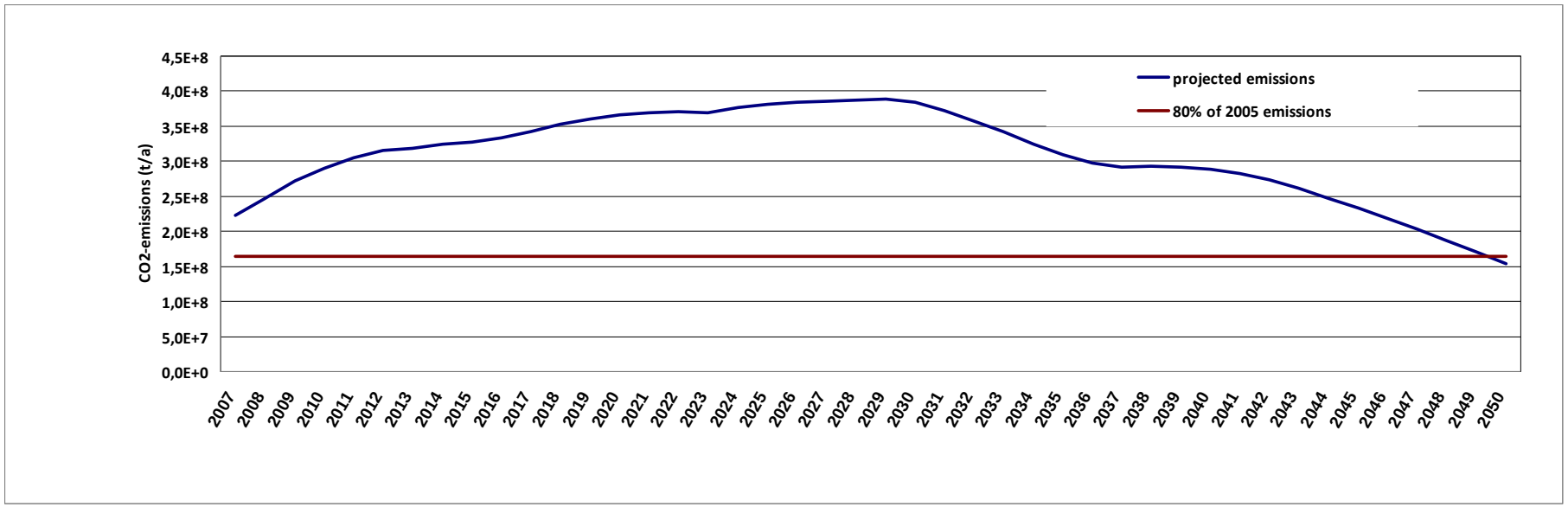
- The emission predictions use an average container vessel based on the IMO GHG study data (with 54.000 t CO_2 / year).
- Without improvements in energy efficiency and emission reduction technologies, the CO_2-emissions will grow from 223 Mt in 2007 to 1.927 Mt in 2050.
- This corresponds to an 8.6-times increase. The IMO GHG study projects a 9-times increase for scenario A1B (which is a high growth scenario).

A real case – moderate improvements



- Improvements are assumed for design and operation
  - design – only affecting new vessels joining the fleet, moderate improvement 0,5% per year, starting 2011 (leading to 20% in 2050)
  - operation – affecting all vessels in the fleet, moderate improvement 1% per year (leading to 40% in 2050)
- With these moderate improvements, the CO_2-emissions will grow from 223 Mt in 2007 to 978 Mt in 2050. This corresponds to an 4.4-times increase.

The best case – challenging improvements in efficiency and emission reduction technologies



- Design – improvement 2% per year, starting 2011
- Operation – improvement 2% per year
- With these challenging improvements, the CO_2-emissions will be reduced from 223 Mt in 2007 to 154 Mt in 2050. Thus, the emission target for 2020 will be met in 2050!
- However, until 2030, emissions increase up to 389 Mt pa.

Conclusions

- Modelling the CO_2-emissions from container shipping resulted in the following
  - without improvements, CO_2-emissions will rise 8.6-fold
  - only with significant improvements in design and operation, CO_2-emissions will be reduced compared to 2005 levels.
- An emission target for shipping and also for the container fleet has not been proposed.
- The investigated scenarios document that container shipping very likely needs to purchase emission credits from other sectors to meet a future emission target.
- GL Strategic Research explores emission reduction technologies today.
- GL FutureShip advises clients how to improve energy efficiency of their vessels.

Thank you for your kind attention!