Shipping CO_2 emissions - Technical solutions and abatement potential

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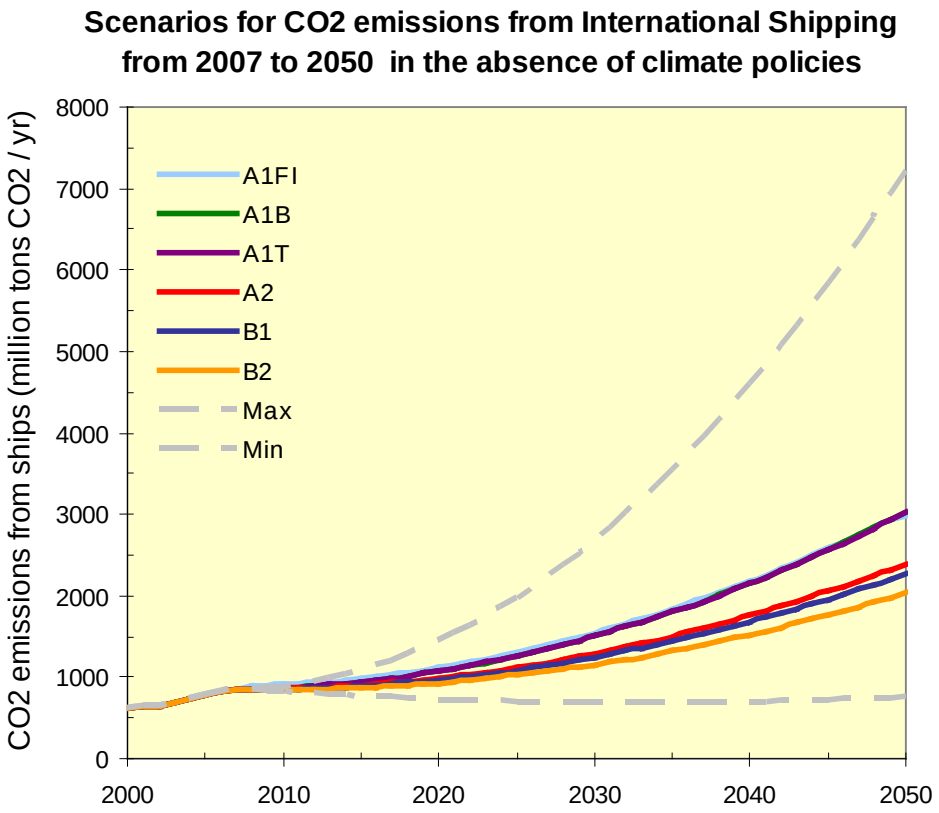
Shipping CO_2 emissions – setting the scene

- Shipping burns approx. 335 million ton of fuel per year… while serving ~85% of the worlds transportation needs
- The associated 2007 total emission of CO_2 is around 1 billion tonnes of CO_2 per year
- Economic growth drives increased trade and transportation
- Emission doubling or trebling by 2050 likely consequence

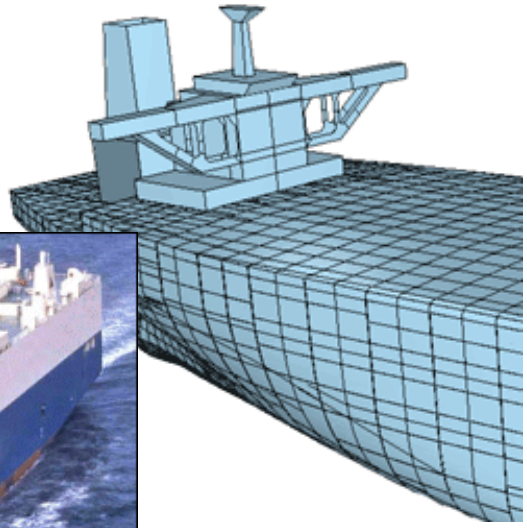


Source; Second IMO GHG Study 2009; MEPC59/INF.10

What can shipping do?

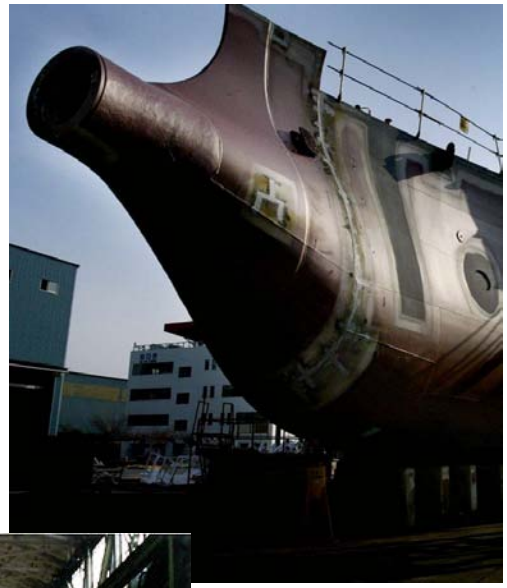
Reduced GHG emissions can be achieved through:

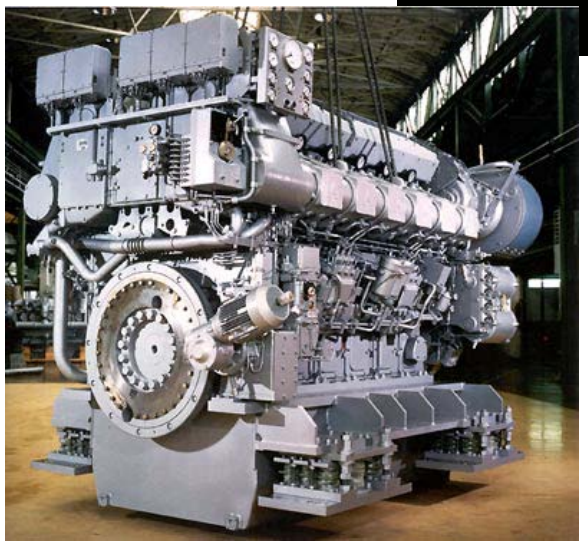
- Technical means
- Operational means
- Structural means



Technical means - examples

- Increase in vessel size – big IS beautiful
- Lines, aft / fore ship design
- Propeller and rudder designs, hull appendages
- Hull coatings
- Air cavity / air bubble lubrication
- More flexible use of main engines, plant optimisation
- Waste heat recovery
- Assisting sails and/or kites
- Technologies to improve minor energy consumers
- Alternative fuels, e.g. LNG





Operational means - examples

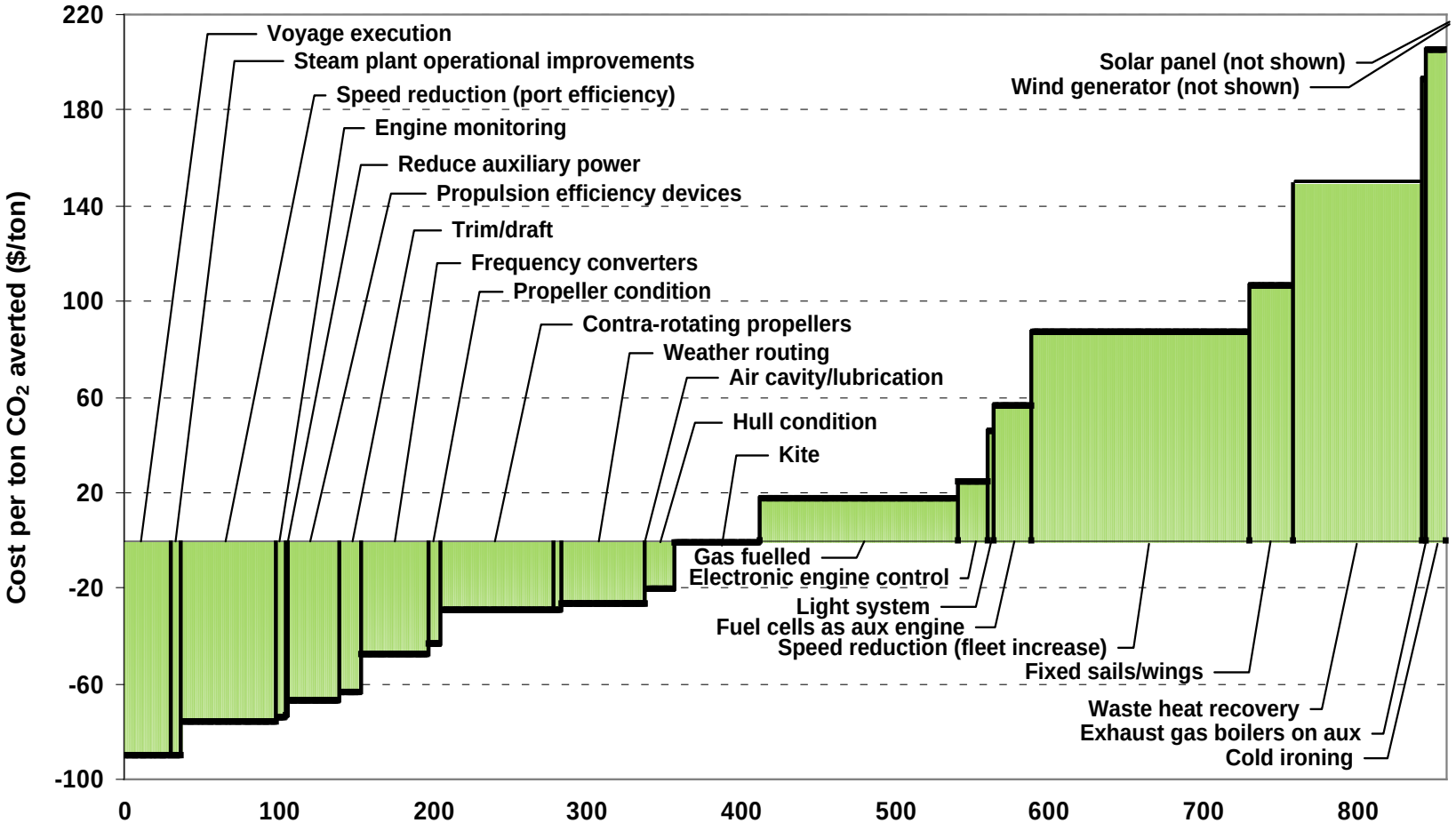
- More frequent cleaning of hull
- Recoating with lower resistance paint types
- More frequent cleaning of propellers or propeller coating
- Optimizing to ballast and trim
- More efficient controls for large energy consumers
- Better route planning, weather routing systems and autopilots
- Speed optimisation

Structural means- examples

- Infrastructure (e.g. cranes, berths, port logistics) to allow for larger capacity ships
- Improving slot time and turn-around systems in ports and canals, just-in-time arrivals
- Shortening travel distance
  - expansion of the Panama Canal
  - less costly passage of the Suez Canal
- Creating incentives, removing barriers
  - green ports, rating schemes, differentiated dues
  - flexibility in sailing speed / slow steaming
  - Contractual framework; *“who pays for the fuel?”, “proceed at all due speed” etc.*

2030 – maximum world fleet abatement potential

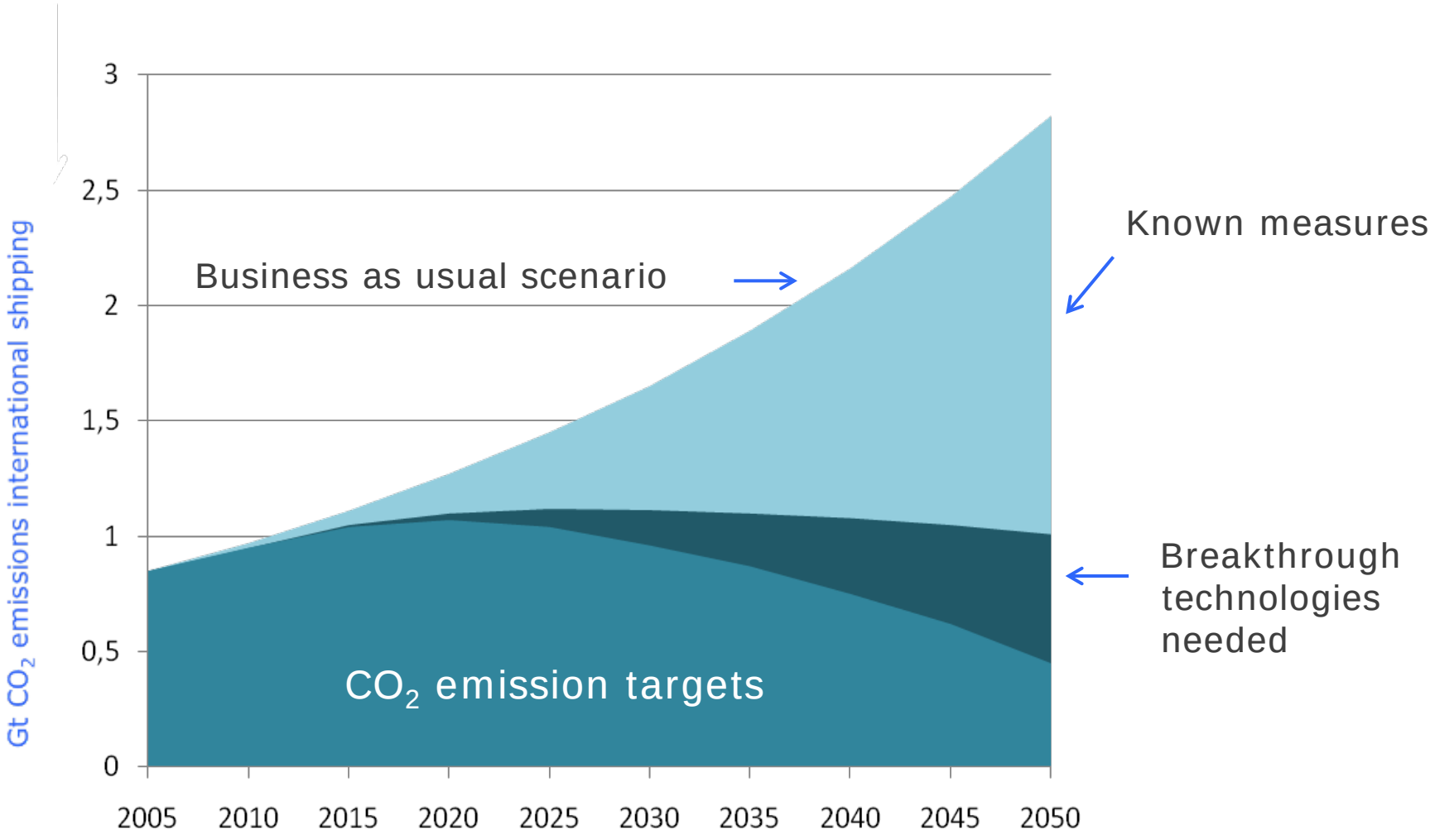
Average marginal CO_2 reduction cost per option - World shipping fleet in 2030 (existing and newbuilds)



Note; abatement potential for individual ship types and size segments vary widely

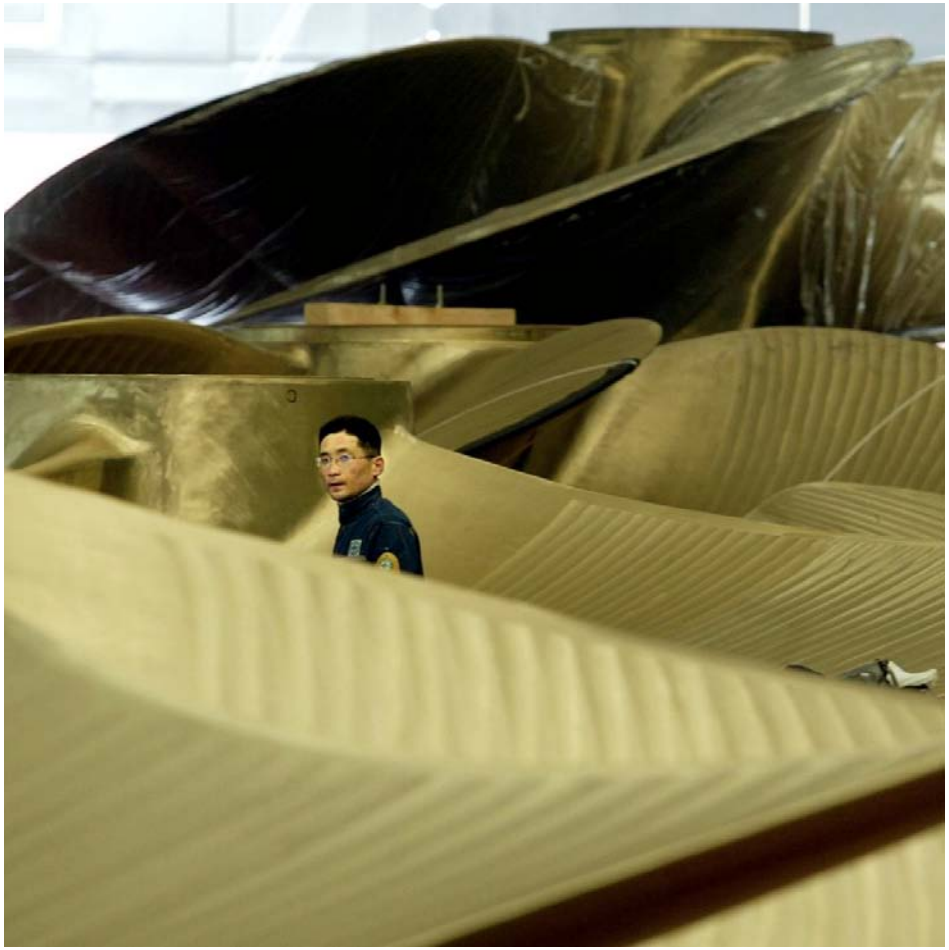
Baseline: 1,530 million tons per year

Indicative future emission scenario, applying MACC measures



Key takeaways

- Significant, but variable, per-ship emission reductions can be realised through technical, operational and structural means
- Abatement calculations show that a number of means are profitable without a price on CO_2 emissions
- But - barriers must be removed for this potential to be realised
- Due to future trade growth, universal adoption of identified means can at best give sectoral emission stabilisation
- Breakthrough technologies needed for further in-sector reductions



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