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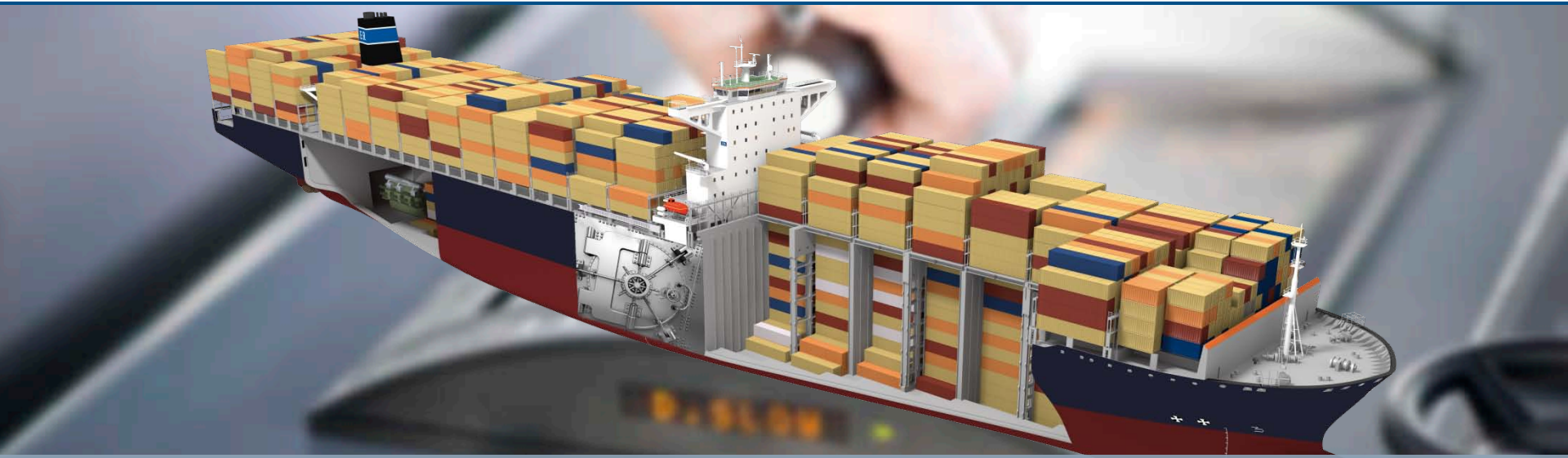


IBIA Annual Convention Hamburg 2014 – 04 November 2014, Hamburg

Dr Hermann J. Klein, CEO E.R. Schiffahrt

Opening keynote:

Setting the scene – the shipowners and shipmanagers point of view

E.R. SCHIFFAHRT

Change of shipping in challenging markets

Ship speeds in 2007

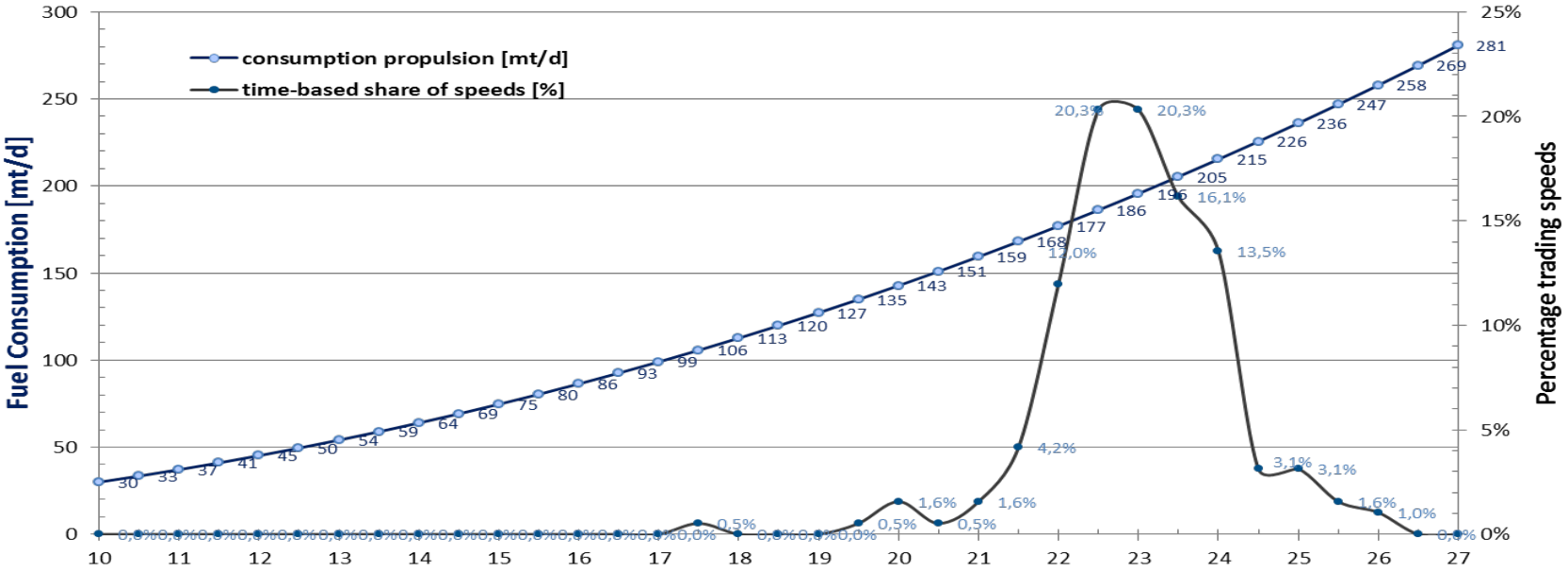
vs.

Ship speeds today

The ship speed is significant lower than 7 years ago!

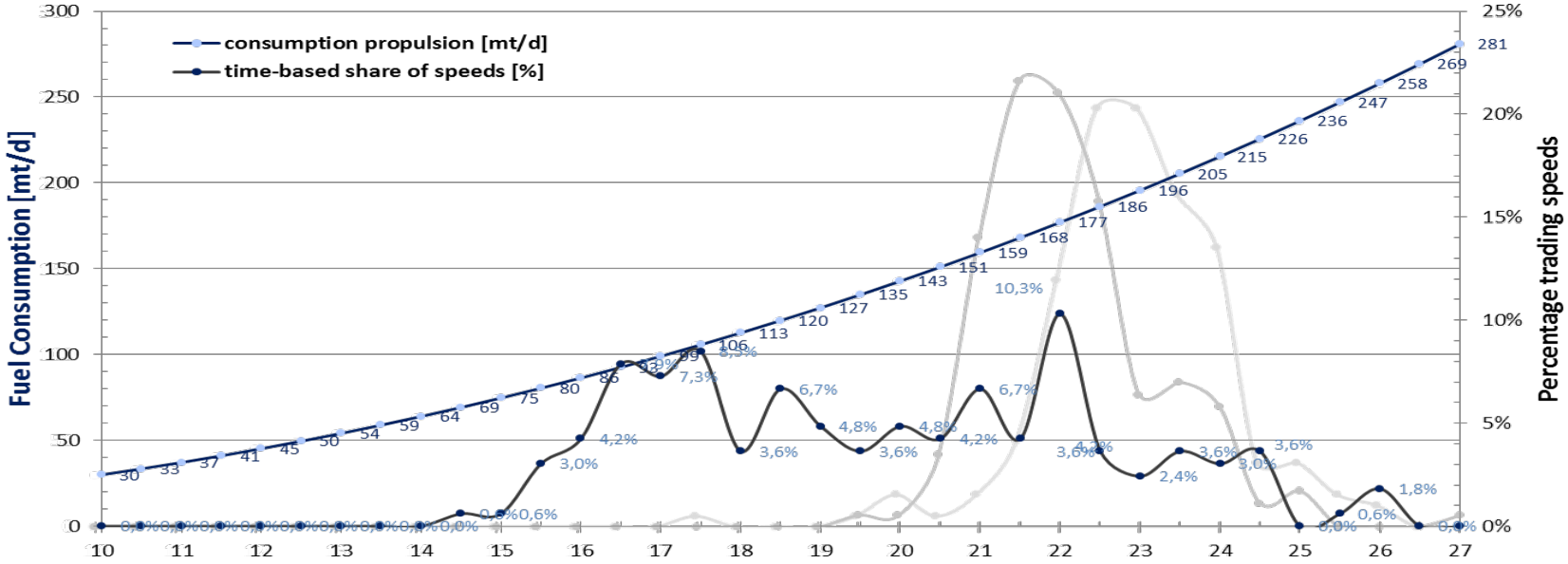
Consumption (Propulsion) [mt/d] 8,500 TEU vessel in 2008

» Weighted mean speed **23 kn** / weighted mean consumption 196 mt/day



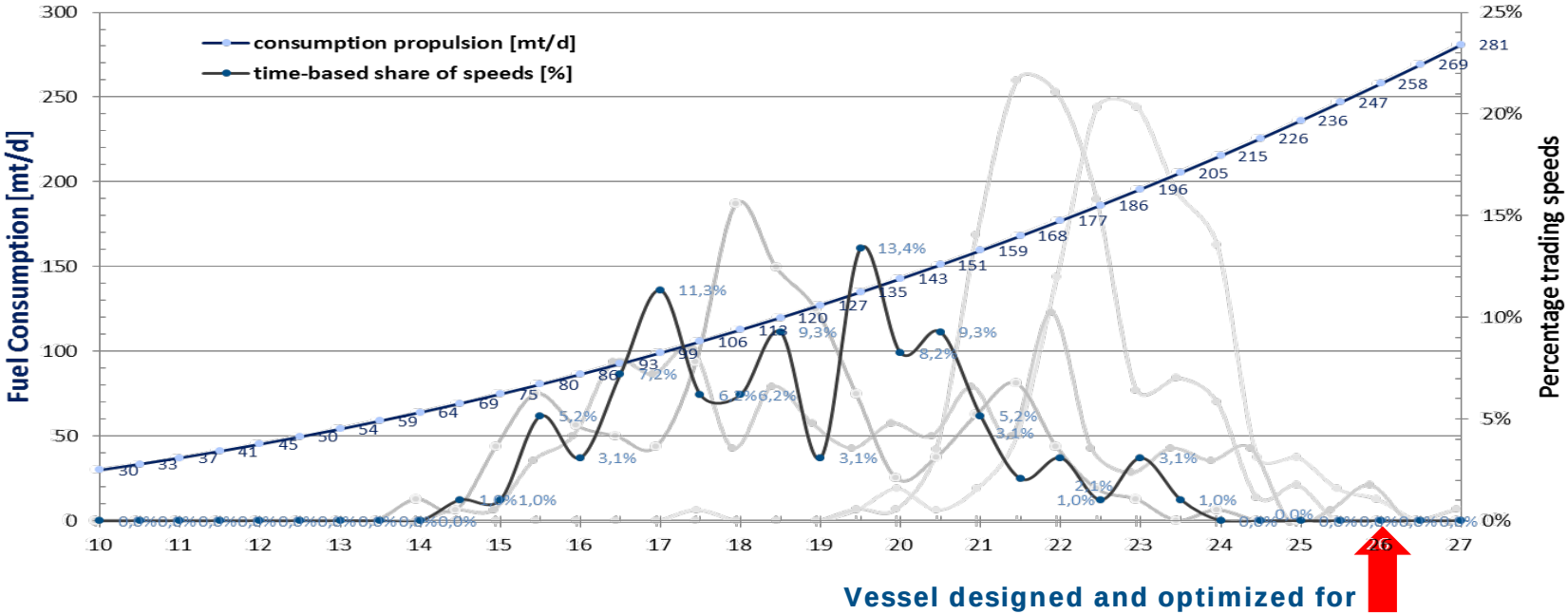
Consumption (Propulsion) [mt/d] 8,500 TEU vessel in 2010

» Weighted mean speed **20 kn** / weighted mean consumption **143 mt/day**



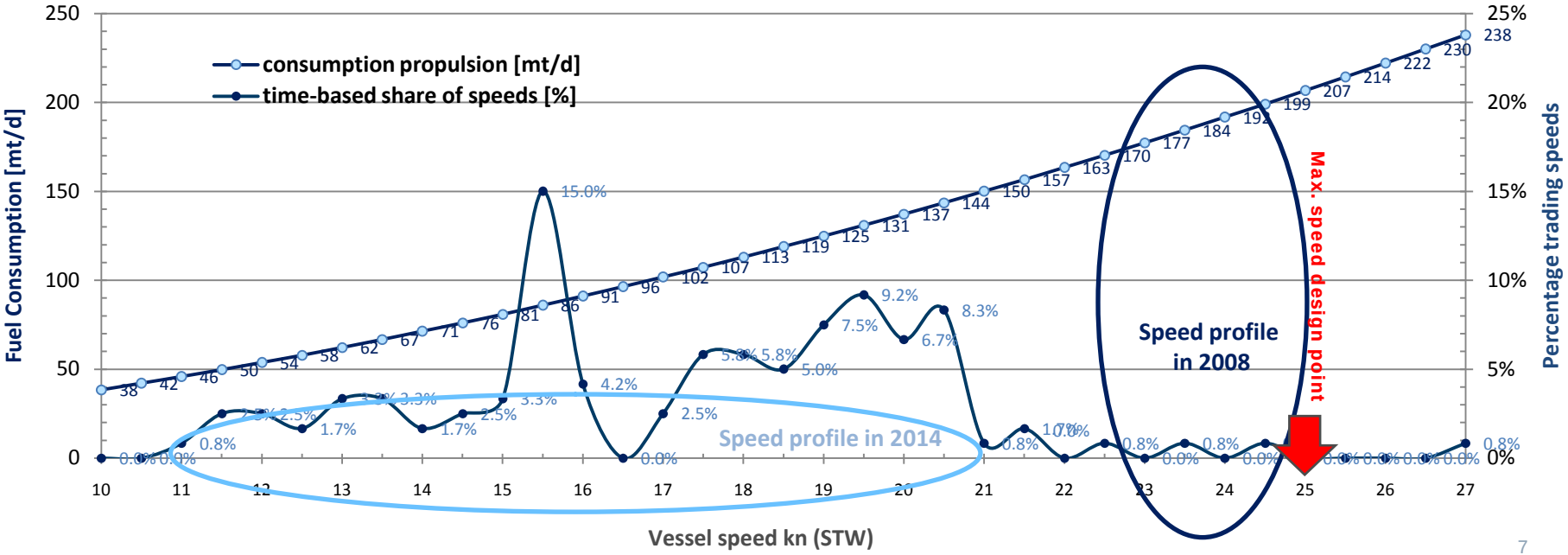
Consumption (Propulsion) [mt/d] 8,500 TEU vessel in 2012

» Weighted mean speed **19 kn** / weighted mean consumption **127 mt/day**



Operational challenge

» Enabling and optimizing vessels for different operation profiles



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Quality & Compliance

Costs / Prices

Emissions

The challenge of efficiency

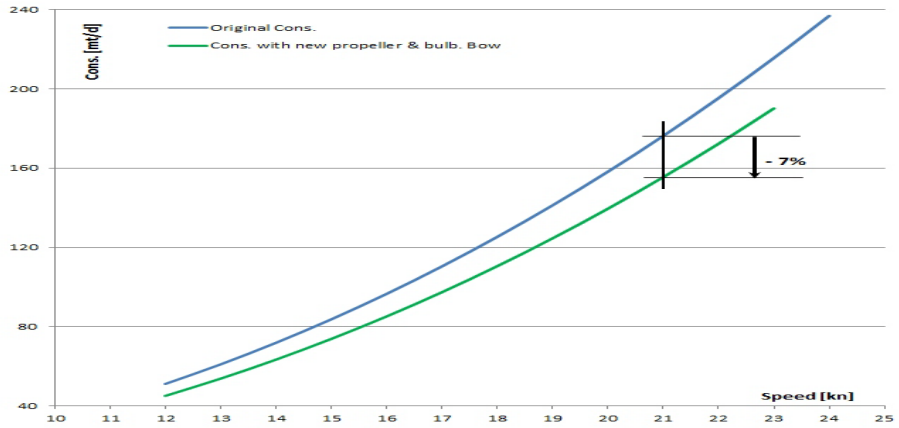
» Increased fuel-efficiency of vessels and main propulsion systems
Identification of consumption components

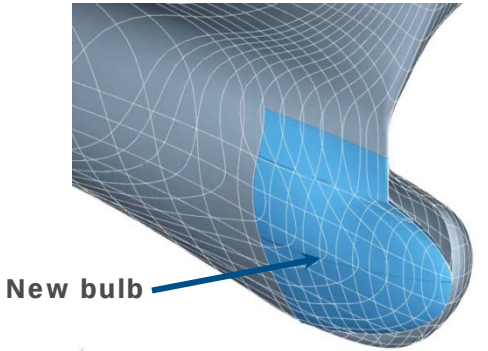
Consumption

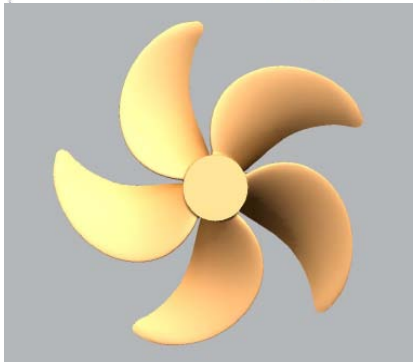
- **Design Reasons**
  - Non-optimized machinery design
  - Non-optimized hull design
- **Operational Reasons**
  - Reasons related to charterers (e.g. scheduling, waiting times at terminals etc.)
  - Reasons related to owner (e.g. voyage execution, trim, maintenance)

Source: APL

Liners demand for optimised vessels

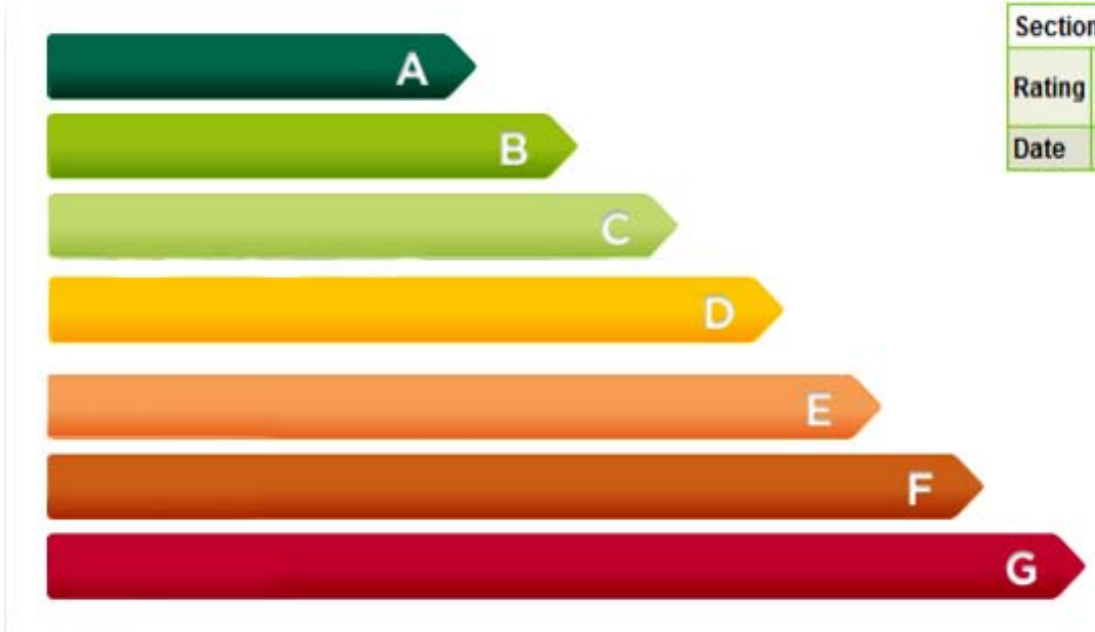






- The new bulbous bow design reduce the form related resistance and optimise the wave resistance for the new operation profile.
- The second benefit of the new bulbous bow installation is a reduced total resistance of the vessel which enable additional optimization and saving potential in way of the propeller design.

Market search for best rated vessels



Section 3: Environmental Rating	
Rating	4 ★★★★☆
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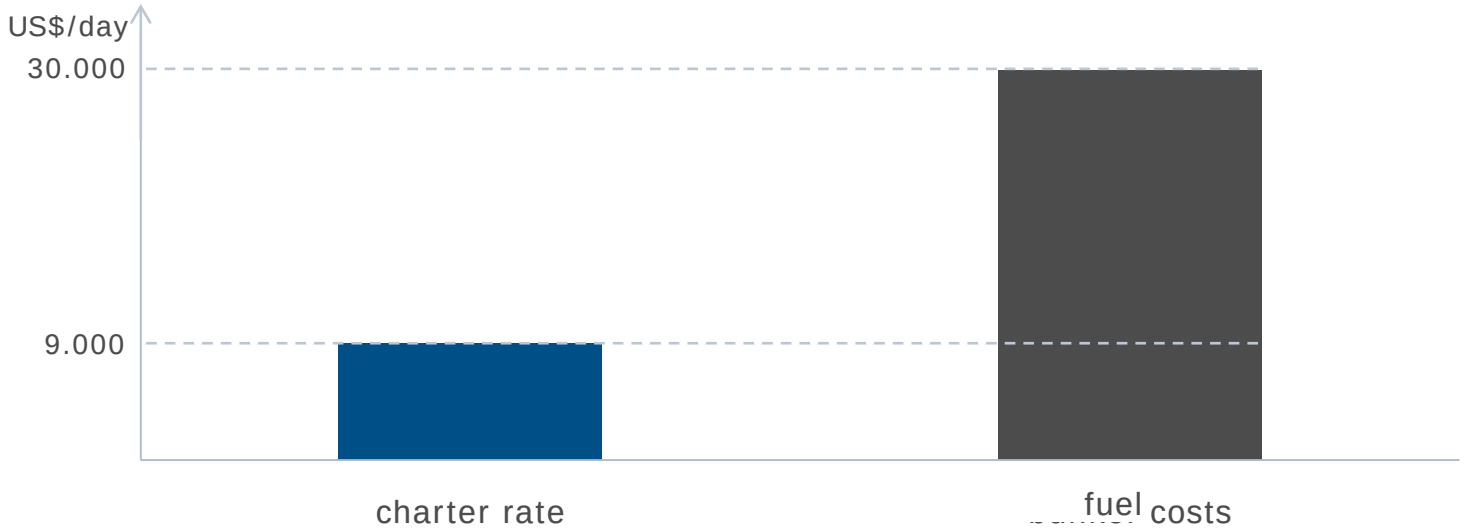
The relevance of total costs



» **10 % fuel consumption reduction equals to 30 % of the charter rate**

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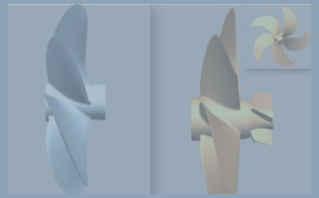
Future proofing to meet upcoming challenges:

1) Regulatory

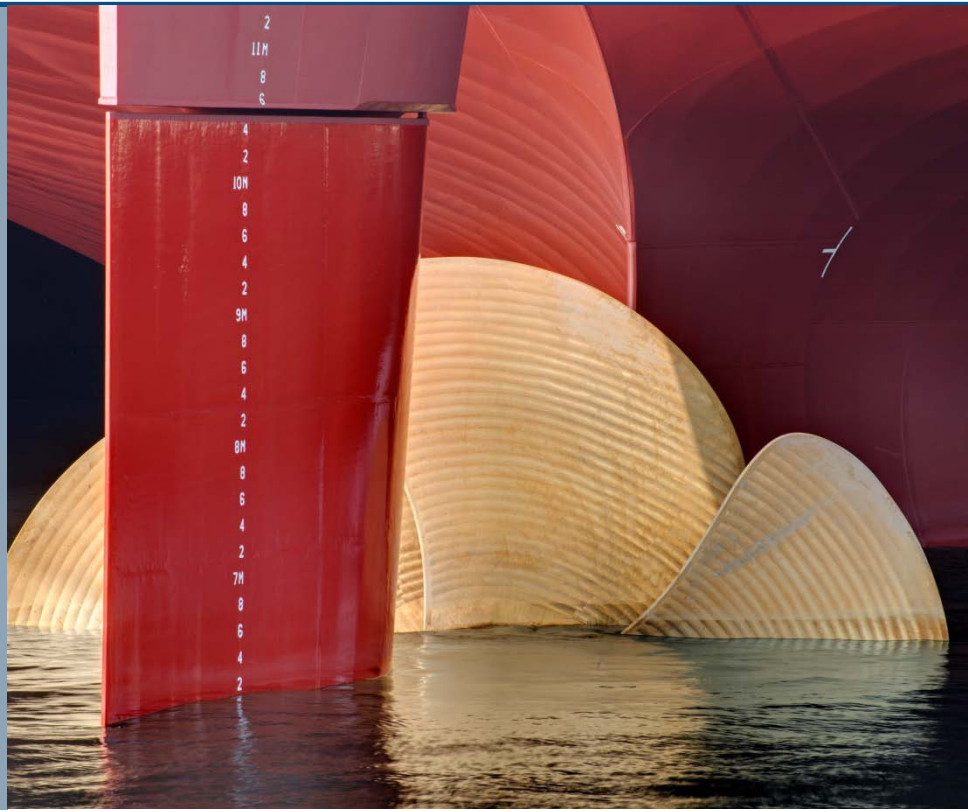
2) Operational

3) Efficiency

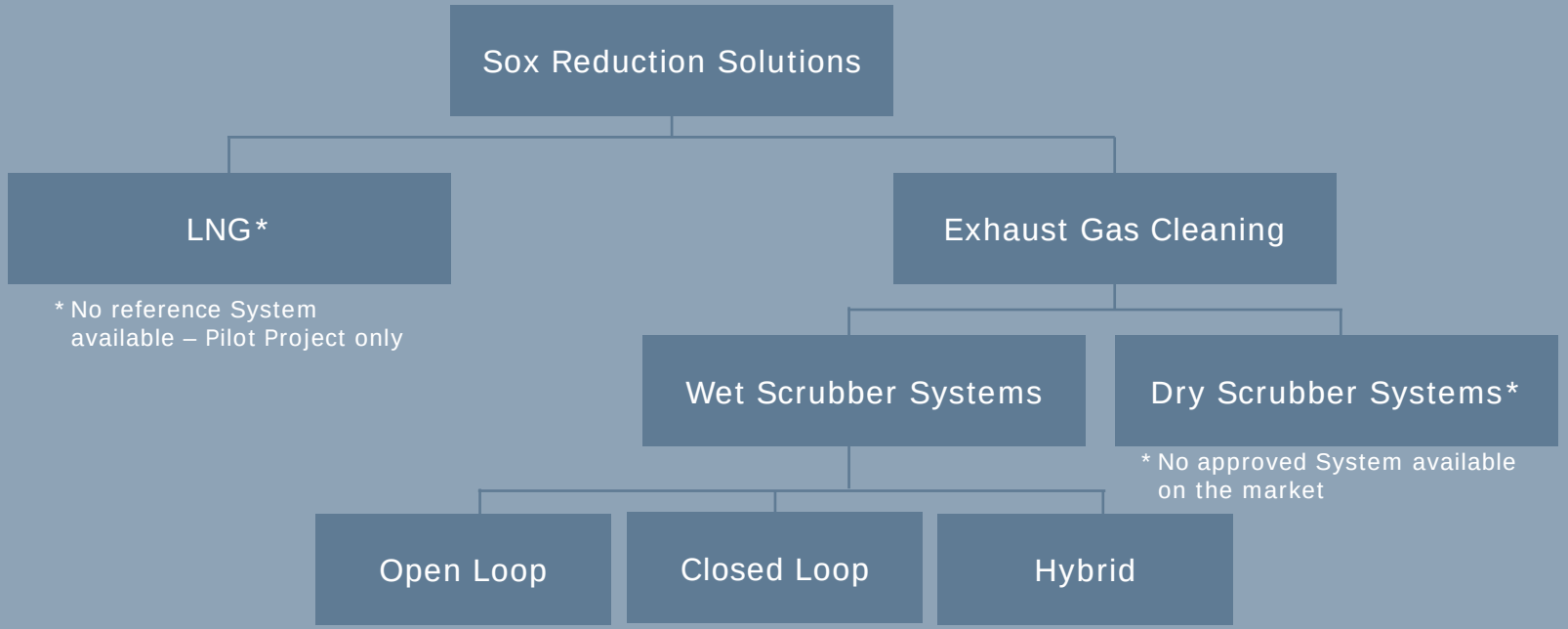


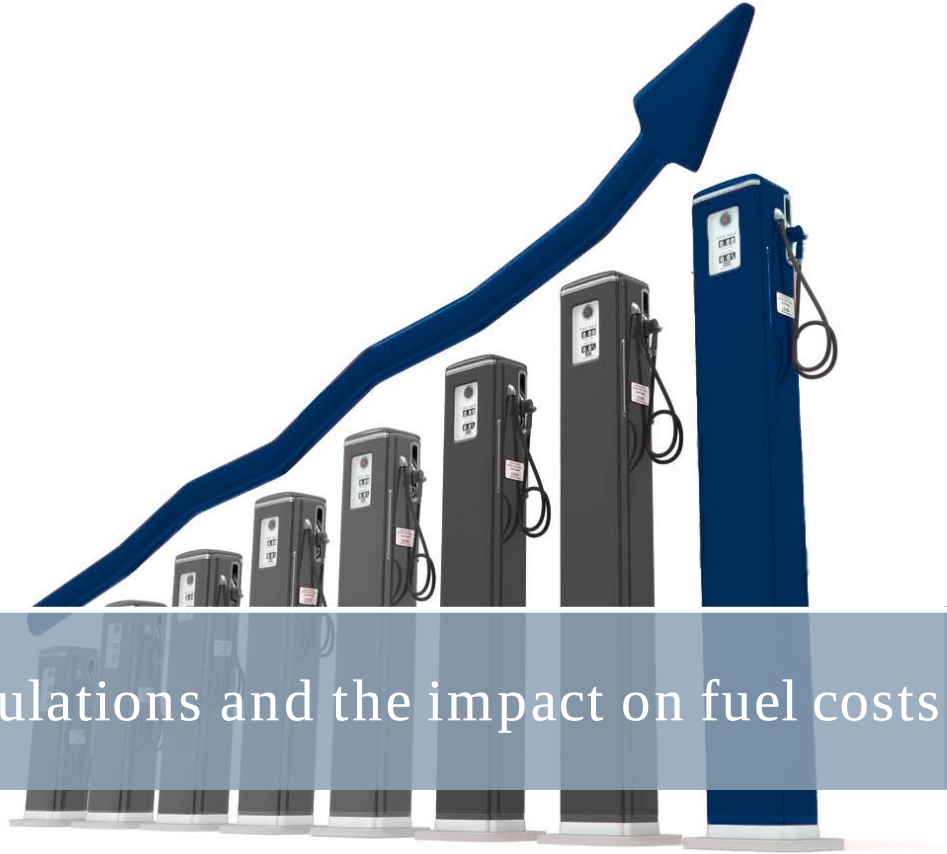
1) Regulatory Challenges

- Limitation of Sulphur
  - Scrubber technology
  - Substitution HFO
- Limitation of Nox
  - New engines
  - Modification kits
  - Substitution HFO
- Monitoring of CO_2
  - Limitation of CO_2
  - Reduction of CO_2
  - Substitution HFO



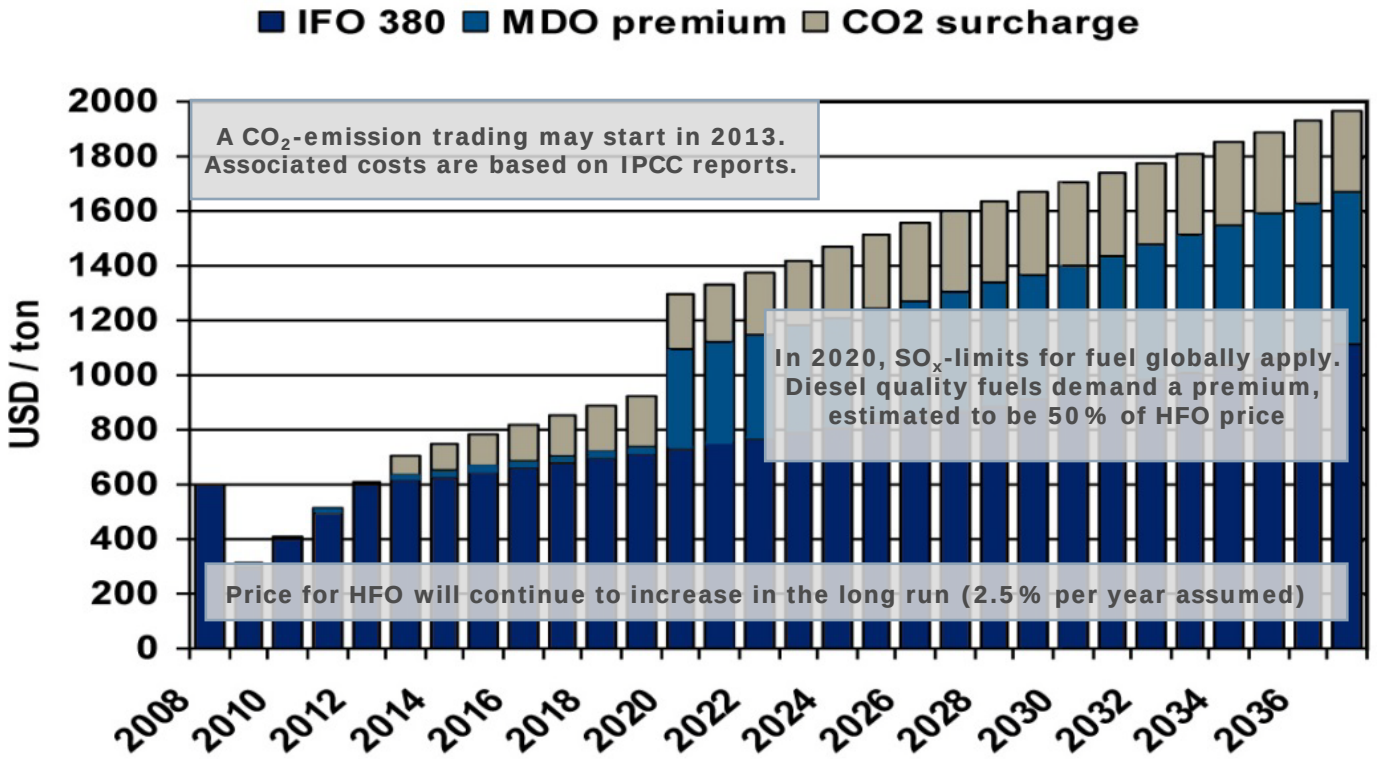
Sox Reduction Solutions (LNG & Exhaust Gas Cleaning Systems)





Low sulphur regulations and the impact on fuel costs

Possible development of fuel costs



Source: DNV GL research. The analysis excludes inflation effects.

Marine Fuels

» **On board handling of different fuel types**

The future of shipping

Yesterday

Arriving

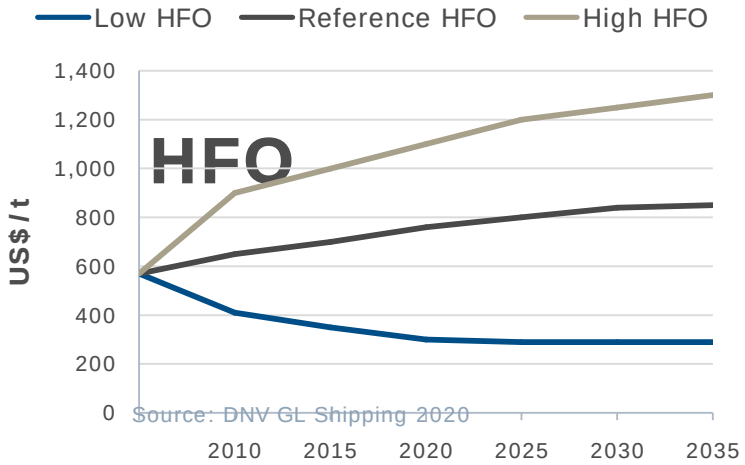
Today

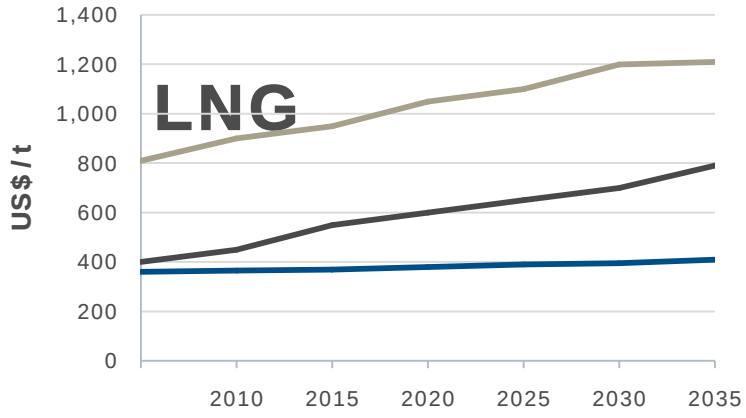
Arriving in time and reliable

Tomorrow

Perfect remote controlled shipping at lowest costs

HFO and LNG Price Projections (2010 – 2035)





- Gross heat of combustion for one kg of natural gas is abt. 49 MJ (≈ 13,5 kWh) and for one kg of HFO abt. 41,5 MJ (≈ 11,0).
- Price per calorific value: LNG is abt. 8% less than HFO and abt. 40% less than MGO.

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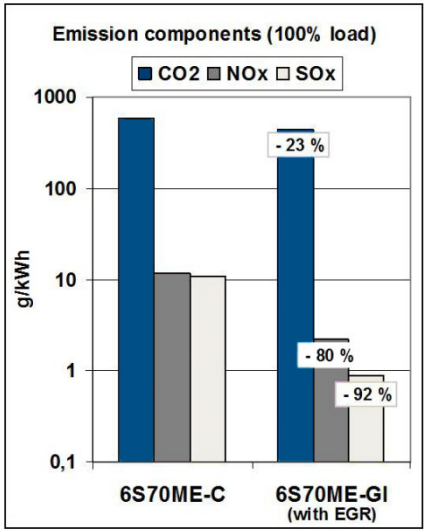
LNG as a solution?

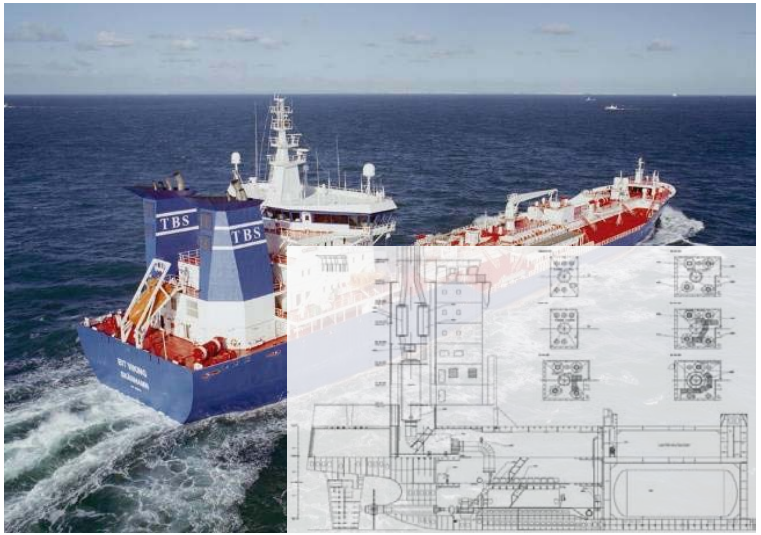
Potential of LNG

» First vessels (ferries, offshore vessels) already in operation.

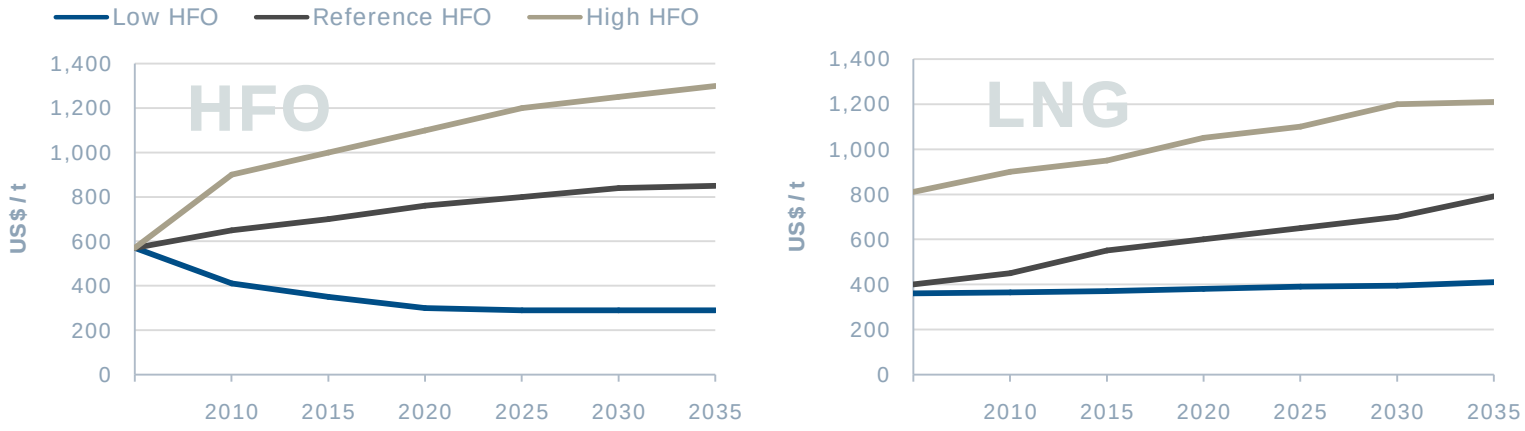
» Tankers are announced. Container vessels under development.



Source: MAN



HFO and LNG price projections (2010 – 2035)



Source: DNV Shipping 2020

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» Price per calorific value: LNG is abt. 8% less than HFO and abt. 40% less than MGO

LNG-Aspects

- Price difference per calorific value
- Difference in emissions
- LNG-Availability and infrastructure
- Price surplus for new ships / conversions
- Tank space and influence on cargo space
- Operational aspects: refueling

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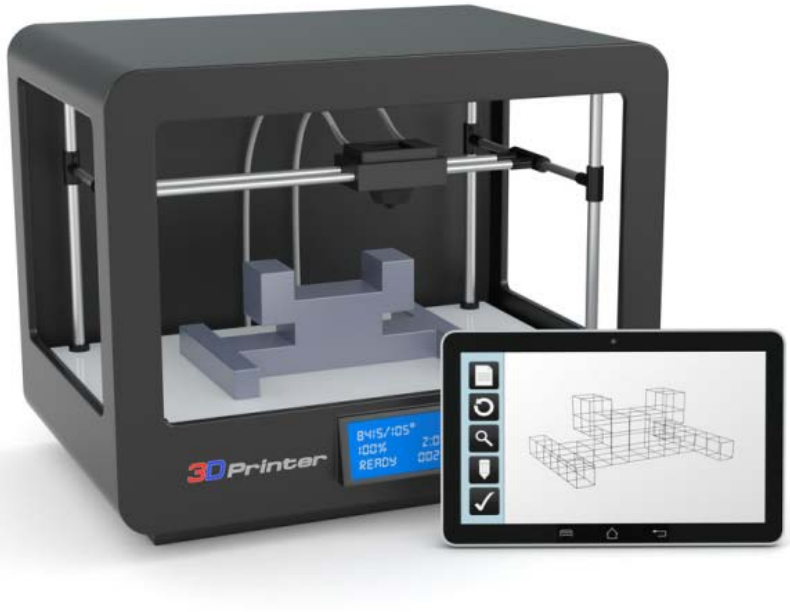
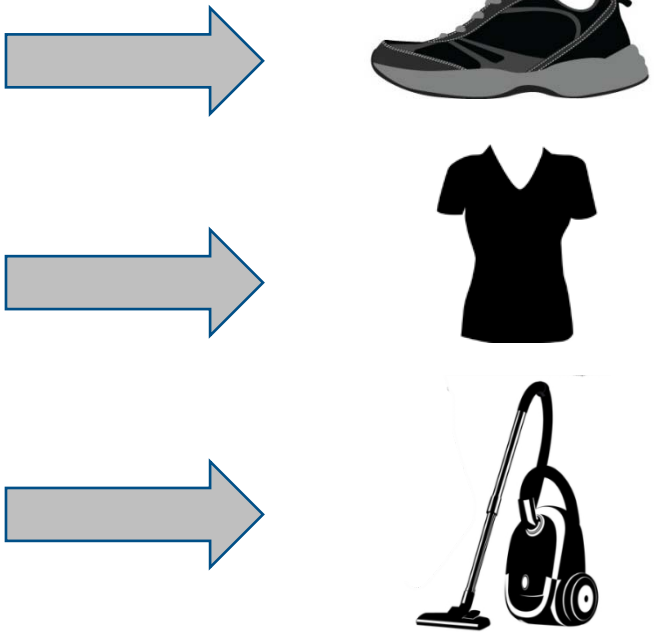
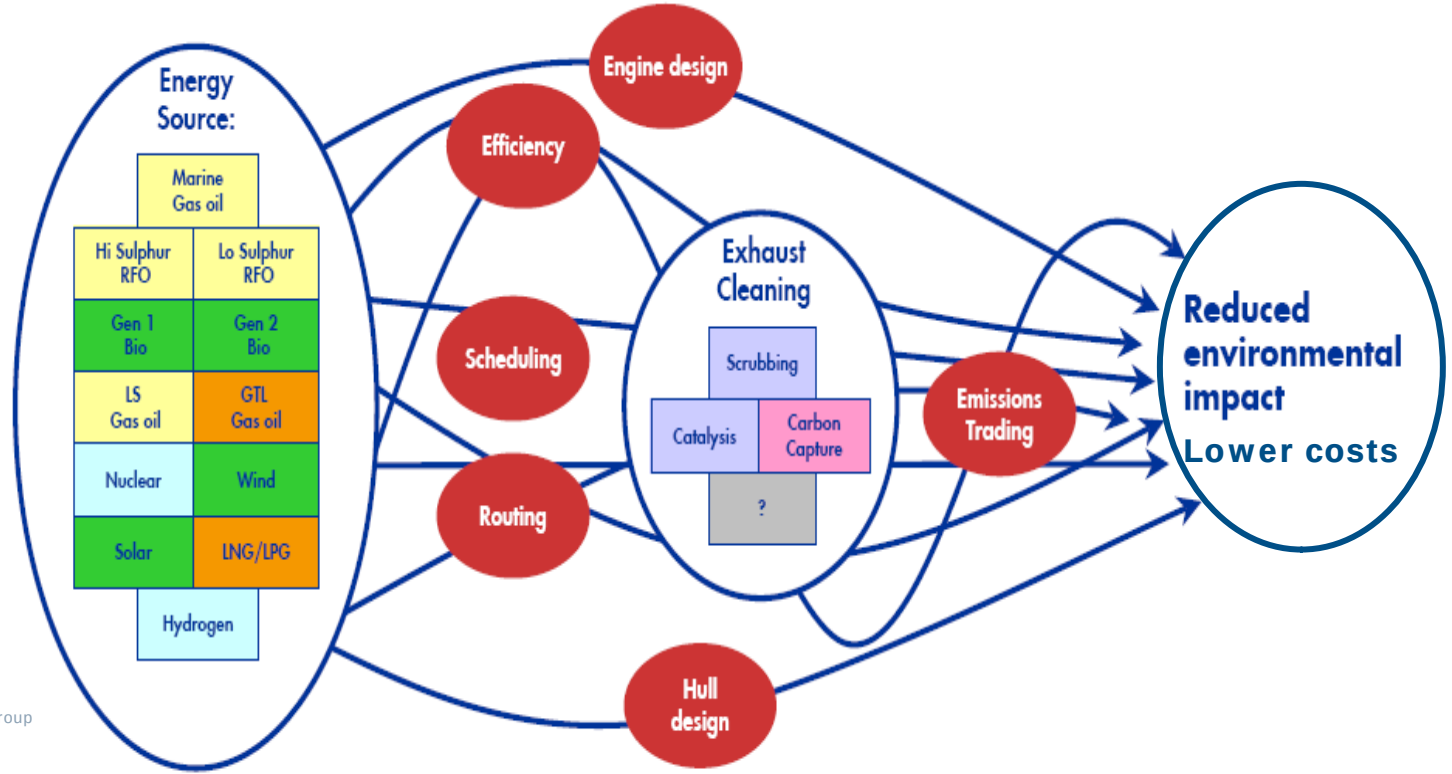
Clean shipping in Hamburg (Fuel Cell and Hydrogen)

3D printers might change the shipping industry and reduce fuel consumption





The challenge for marine propulsion & auxiliary machinery



Source: DNV GL Group

Thank you