Future-proof ships – the blueprint for newbuilds

Capital Link, London

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25 September 2018
100 years of incremental changes

1911
MS Selandia Steel
- 6800 dwt
- Diesel
- 12 knots
- 1840 kW
- 10 t/day

2011
MS Current Steel
- 6800 dwt
- MGO/HFO
- 12.5 knots
- 2300 kW
- ~8 t/day

2020
MS Future-proof Steel

2050
??

MS Future Steel
??
Local pollution (SOx, NOx and particles) - a major health concern in densely populated areas

■ 0.50% global limit (MARPOL, 2020)
■ 0.10% Emission Control Area limit (MARPOL)
■ 0.50% limit, China national waters (12 nm), 2019

Source: Maritime Forecast to 2050, DNV GL 2018
Greenhouse gases and global warming - a global challenge
April 2018: IMO GHG Strategy with targets and policy measures

GHG emissions

- 2008 as base year
- Peak as soon as possible
- Intensity: 40% red.
- Total: 50% red. Intensity: 70%
- Zero emissions as soon as possible within this century
- within 2100

Emission pathway in line with IMO's GHG strategy
Business-as-usual emissions
Emission gap

Carbon intensity is measured as CO₂ emission per tonne-mile, while Total is the absolute GHG emission from international shipping.
By 2050, 39% of shipping energy will be supplied by carbon-neutral fuels, surpassing liquid fossil fuels.

Source: Maritime Forecast to 2050, DNV GL 2018
It is not clear which fuels and technologies will win in the short or long term. But we need to build ships today – how can we make it robust?
The Carbon Robustness Framework
Ensuring a competitive ship under possible future scenarios

Your designs

Design choices

Competing fleet

Break-even cost:
- Capital costs
- 30% equity/70% loan
- 20 year repayment
- Voyage costs
- Operational costs

Variables

Fuel prices

CO₂ Price

Design A: The standard ship
Design B: The LNG powered ship
Design C: The fuel efficient ship

Design choices

Policy scenarios

Year

Break-even cost:
- Capital costs
- 30% equity/70% loan
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Policy scenarios

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- Capital costs
- 30% equity/70% loan
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- Operational costs

Variables

Fuel prices

CO₂ Price

Design choices

Policy scenarios

Year
Case study: 55000 dwt bulk carrier

Your designs

**Design A: The standard ship**
- Running on MGO/LSHFO
- Standard newbuild energy-efficiency levels

**Design B: The LNG-powered ship**
- Running on LNG
- Standard newbuild energy-efficiency levels

**Design C: The fuel-efficient ship**
- Running on MGO/LSHFO
- Enhanced levels of energy efficiency

Competing fleet

**Scenario: Dull Blue**
- Shipping does not meet the IMO GHG targets for 2050
- Few regulations are put in place to reduce GHG

Fuel prices
- HFO/MGO/LNG: 400/600/700 USD/tonne

CO₂ Price
- No CO₂ price

Design A
- Top 5%
- Top 20%
- Average
- Bottom 20%
- Bottom 5%
Case study: 55000 dwt bulk carrier – what happens in 2030?

Your designs

**Design A: The standard ship**
- Running on MGO/LSHFO
- Standard newbuild energy-efficiency levels

**Design B: The LNG-powered ship**
- Running on LNG
- Standard newbuild energy-efficiency levels

**Design C: The fuel-efficient ship**
- Running on MGO/LSHFO
- Enhanced levels of energy efficiency

<table>
<thead>
<tr>
<th>Competitiveness</th>
<th>Top 5 %</th>
<th>Top 20 %</th>
<th>Bottom 20 %</th>
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<tbody>
<tr>
<td>Design A</td>
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**Fuel prices**
- HFO/MGO/LNG: 400/600/700 USD/tonne

**CO₂ Price**
- No CO₂ price

**Scenario: Dull Blue**
- Shipping does not meet the IMO GHG targets for 2050
- Few regulations are put in place to reduce GHG
Case study: 55000 dwt bulk carrier – what if shipping starts reducing CO₂?

Your designs

**Design A: The standard ship**
- Running on MGO/LSHFO
- Standard newbuild energy-efficiency levels

**Design B: The LNG-powered ship**
- Running on LNG
- Standard newbuild energy-efficiency levels

**Design C: The fuel-efficient ship**
- Running on MGO/LSHFO
- Enhanced levels of energy efficiency

**Competing fleet**

**Scenario: Bright Green**
- Shipping meets the IMO GHG targets for 2050
- Regulations are put in place to enforce the change

**Fuel prices**
- HFO/MGO/LNG: 400/600/700 USD/tonne

**CO₂ Price**
- 50 USD/tonne from 2030
Your designs

**Design A: The standard ship**
- Running on MGO/LSHFO
- Standard newbuild energy-efficiency levels

**Design B: The LNG-powered ship**
- Running on LNG
- Standard newbuild energy-efficiency levels

**Design C: The fuel-efficient ship**
- Running on MGO/LSHFO
- Enhanced levels of energy efficiency

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### Scenario: Bright Green

- Shipping meets the IMO GHG targets for 2050
- Regulations are put in place to enforce the change

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**2030**

- **HFO/MGO/LNG:** 550/750/700 USD/tonne
- **CO2 Price:** 50 USD/tonne from 2030
Case study: 55000 dwt bulk carrier – what if we apply more energy efficiency measures?

Your designs

**Design A: The standard ship**
- Running on MGO/LSHFO
- Standard newbuild energy-efficiency levels

**Design B: The LNG-powered ship**
- Running on LNG
- Enhanced levels of energy efficiency

**Design C: The fuel-efficient ship**
- Running on MGO/LSHFO
- Extensive levels of energy efficiency

Competing fleet

**Scenario: Bright Green**
- Shipping meets the IMO GHG targets for 2050
- Regulations are put in place to enforce the change

Fuel prices:
- HFO/MGO/LNG: 400/600/700 USD/tonne

CO₂ Price:
- 50 USD/tonne from 2030
Case study: 55000 dwt bulk carrier – and what about scrubbers?

Your designs

Design A: The standard ship
- Running on HFO with scrubber
- Standard newbuild energy-efficiency levels

Design B: The LNG-powered ship
- Running on LNG
- Enhanced levels of energy efficiency

Design C: The fuel-efficient ship
- Running on HFO with scrubber
- Enhanced levels of energy efficiency

Competing fleet

Scenario: Bright Green
- Shipping meets the IMO GHG targets for 2050
- Regulations are put in place to enforce the change

2030

Fuel prices
- HFO/MGO/LNG: 400/600/700 USD/tonne

CO₂ Price
- 50 USD/tonne from 2030
What is a future-proof ship today?

- Given current spread on HFO and MGO, scrubber is a good choice, but exposed to further regulations on GHG, such as a carbon tax.
- LNG is capital intensive, but robust in the long run (more than 10 years) with further GHG regulations.
- Energy efficiency measures are robust as sustained higher fuel prices are expected in the future.
- Each segment has its particulars (designs, operational patterns, contracts) – not necessary the same conclusion for all ship types and owners.
Thank you for your attention!

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