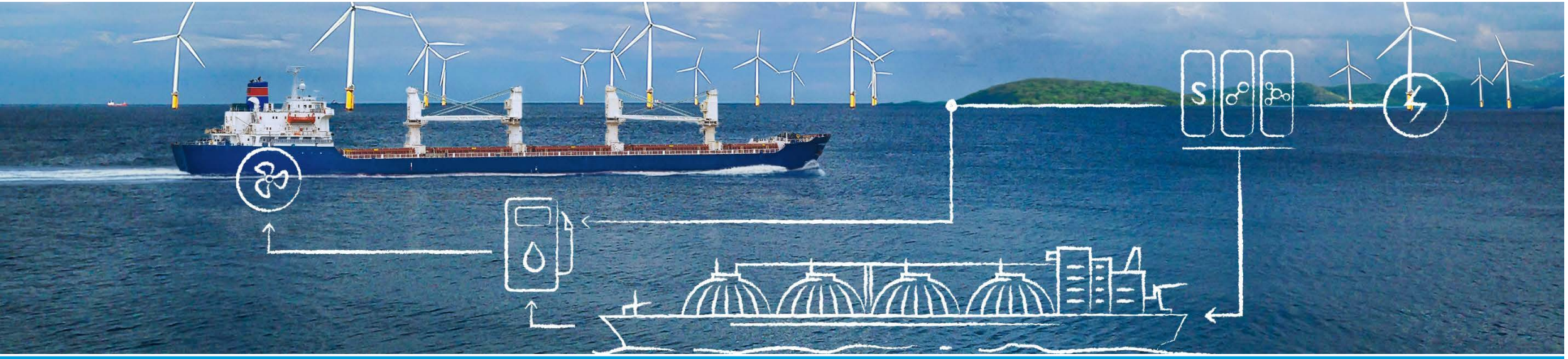


MARITIME

Future-proof ships – the blueprint for newbuilds

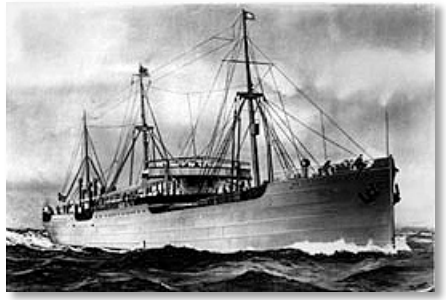
Capital Link, London

Tore Longva

25 September 2018

100 years of incremental changes

1911 2011 2020 2050



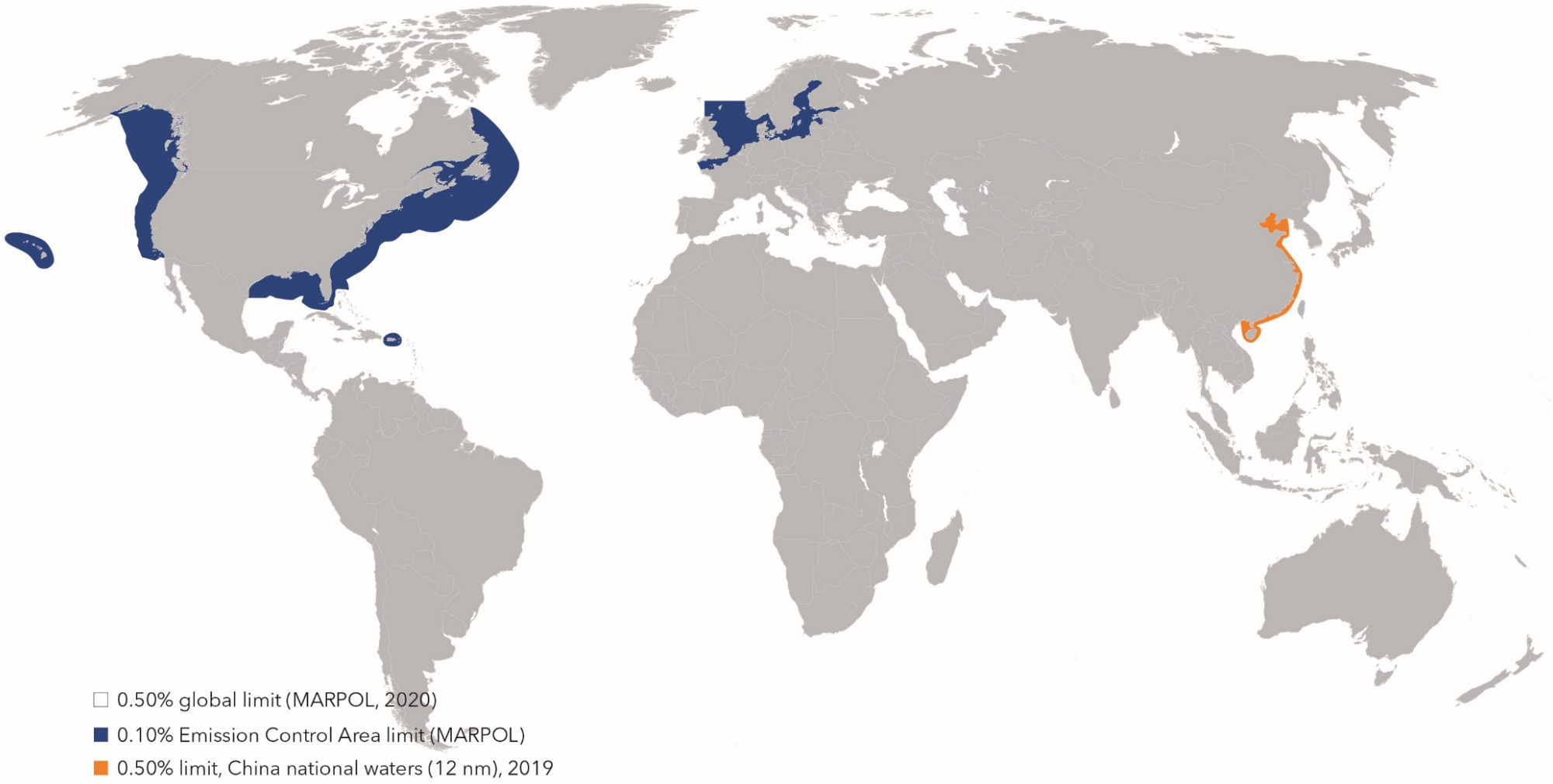
MS Selandia
Steel
6800 dwt
Diesel
12 knots
1840 kW
10 t/day

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

MS Future-proof
Steel
?

MS Future
Steel
?

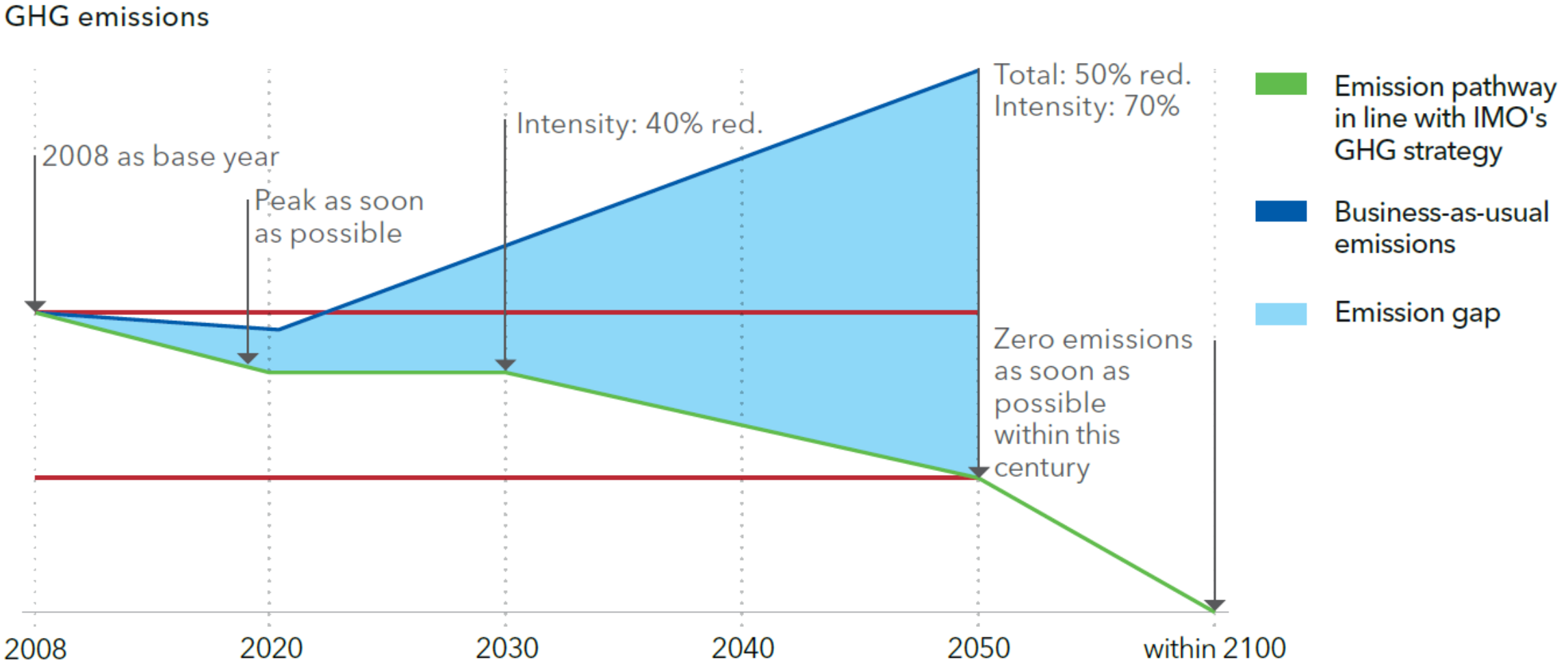
Local pollution (SOx, NOx and particles) - a major health concern in densely populated areas



Source: Maritime Forecast to 2050, DNV GL 2018

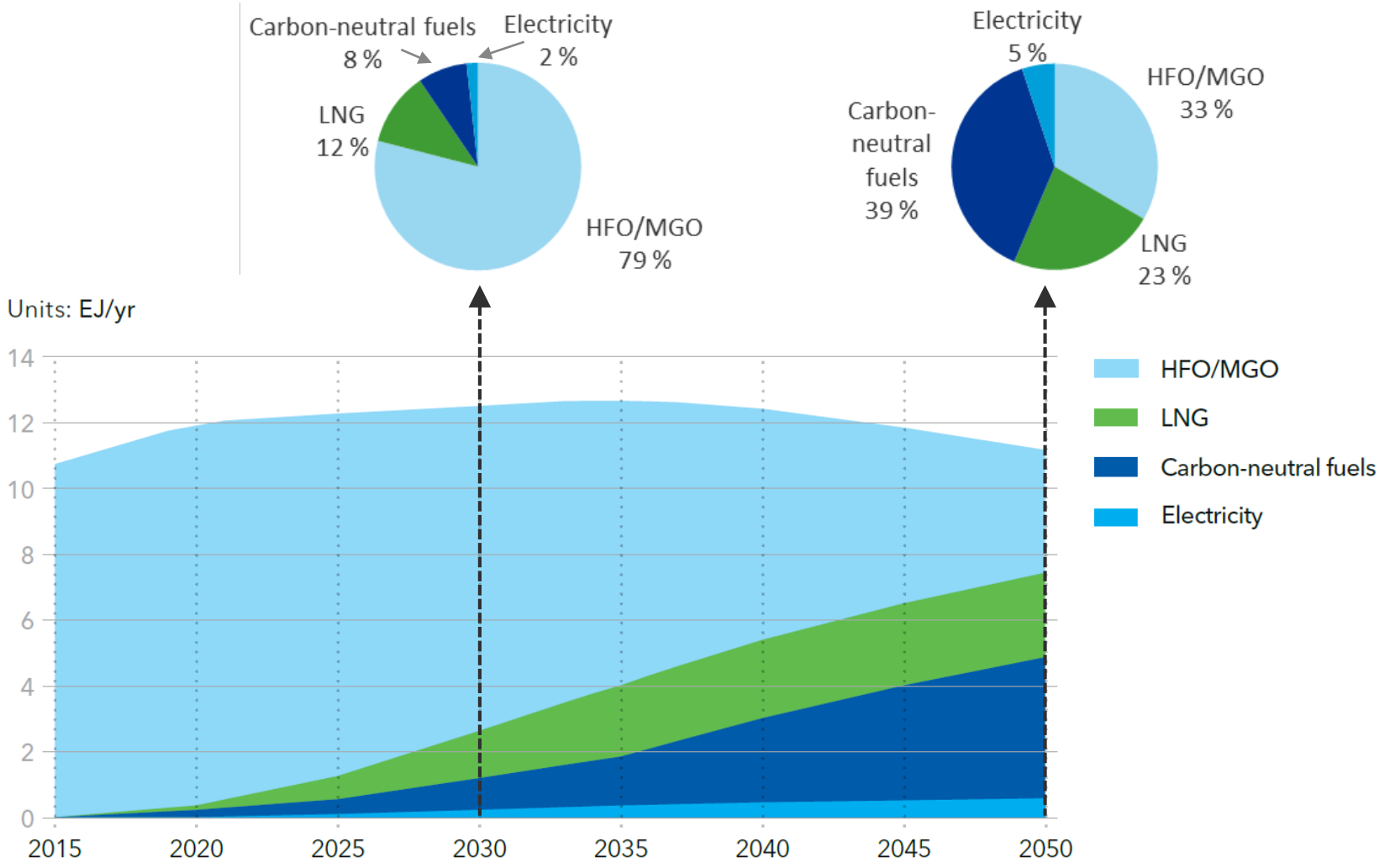

ANTIGUA AND BARBUDA
ANGOLA
COSTA RICA
CUBA
CYPRUS
ALGERIA

Greenhouse gases and global warming - a global challenge
April 2018: IMO GHG Strategy with targets and policy measures



Carbon intensity is measured as CO_2 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

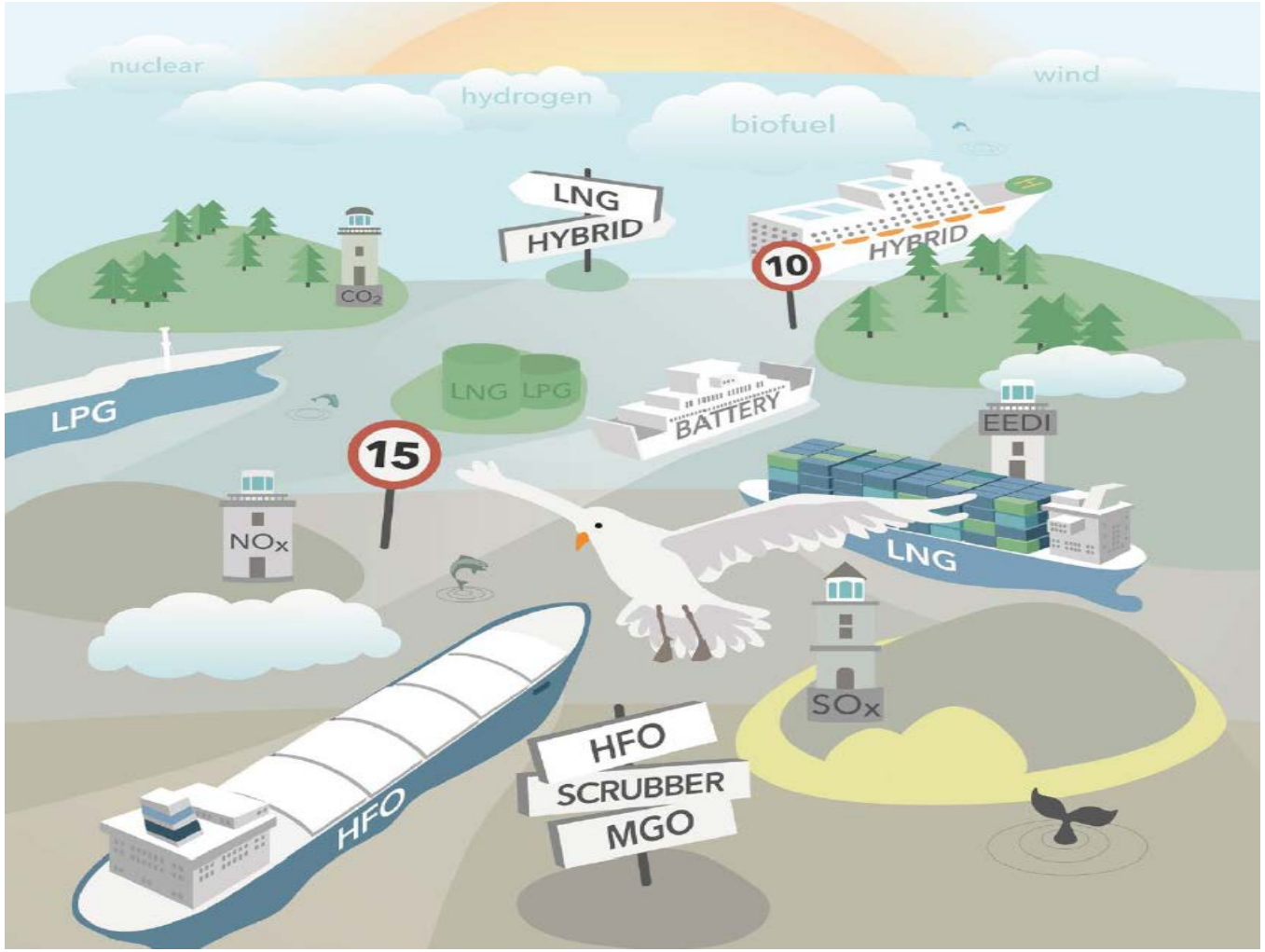
It is not clear which fuels and technologies will win in the short or long term
But we need to build ships today – how can we make it robust?

Market

Regulation

Technology

Stakeholder

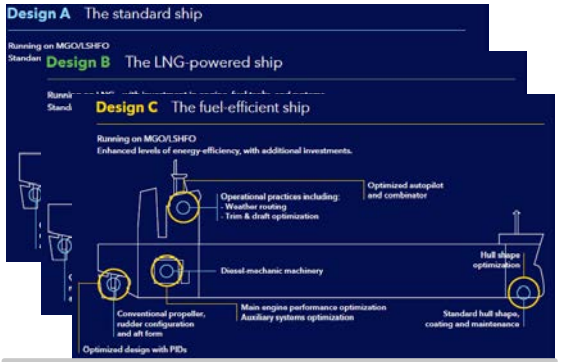


The Carbon Robustness Framework
Ensuring a competitive ship under possible future scenarios

Your designs

vs

Competing fleet



Design choices

Design C

Design A

Design B

Competitiveness

Top 5 %

Bottom 5 %

Break-even cost:

- Capital costs
  - 30% equity/70% loan
  - 20 year repayment
- Voyage costs
- Operational costs

Fuel prices

CO_2 Price

Variables

Year

Policy scenarios

Case study: 55000 dwt bulk carrier

Your designs

Design A: The standard ship

- Running on MGO/LSHFO
- Standard newbuild energy-efficiency levels

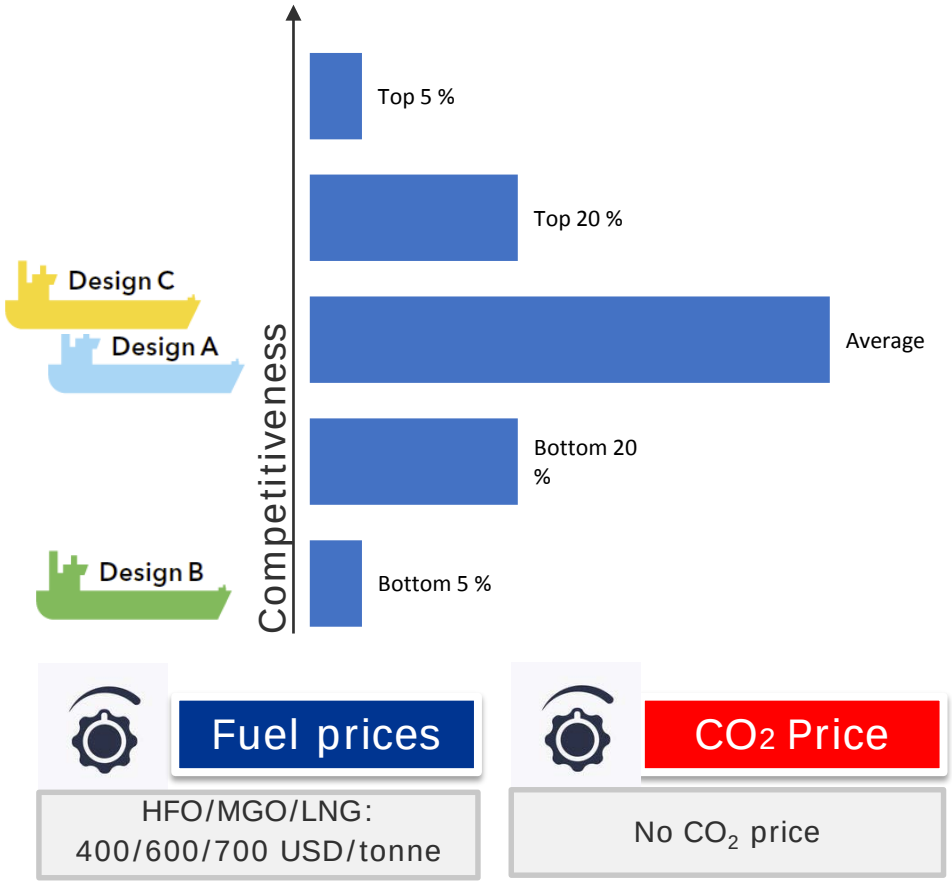
Design B: The LNG-powered ship

- Running on LNG
- Standard newbuild energy-efficiency levels

Design C: The fuel-efficient ship

- Running on MGO/LSHFO
- Enhanced levels of energy efficiency

vs



Competing fleet

2020

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 happens in 2030?

Your designs

Design A: The standard ship

- Running on MGO/LSHFO
- Standard newbuild energy-efficiency levels

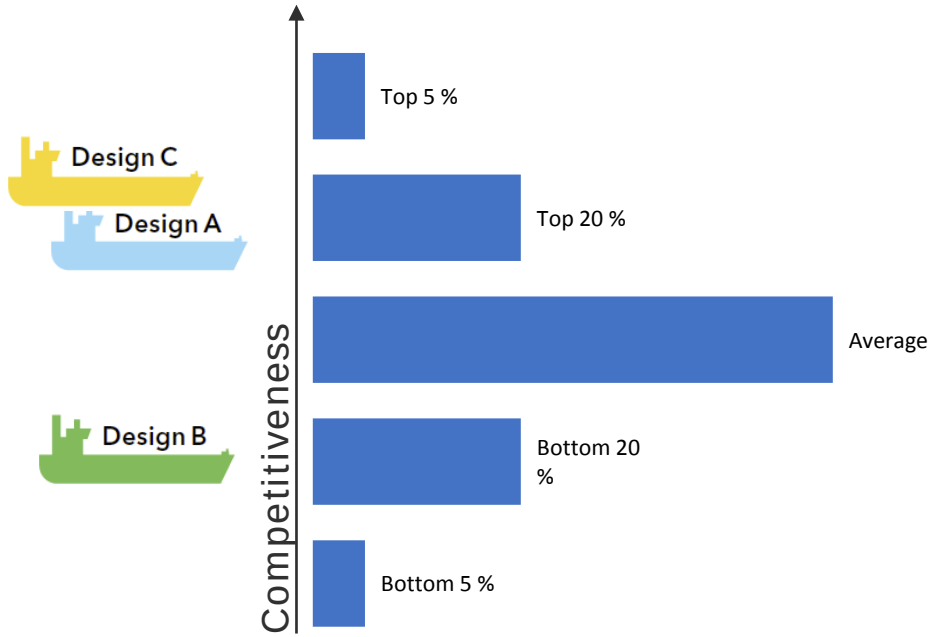
Design B: The LNG-powered ship

- Running on LNG
- Standard newbuild energy-efficiency levels

Design C: The fuel-efficient ship

- Running on MGO/LSHFO
- Enhanced levels of energy efficiency

vs



Fuel prices

HFO/MGO/LNG: 400/600/700 USD/tonne

CO_2 Price

No CO_2 price

Competing fleet

2030

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 CO_2?

Your designs

Design A: The standard ship

- Running on MGO/LSHFO
- Standard newbuild energy-efficiency levels

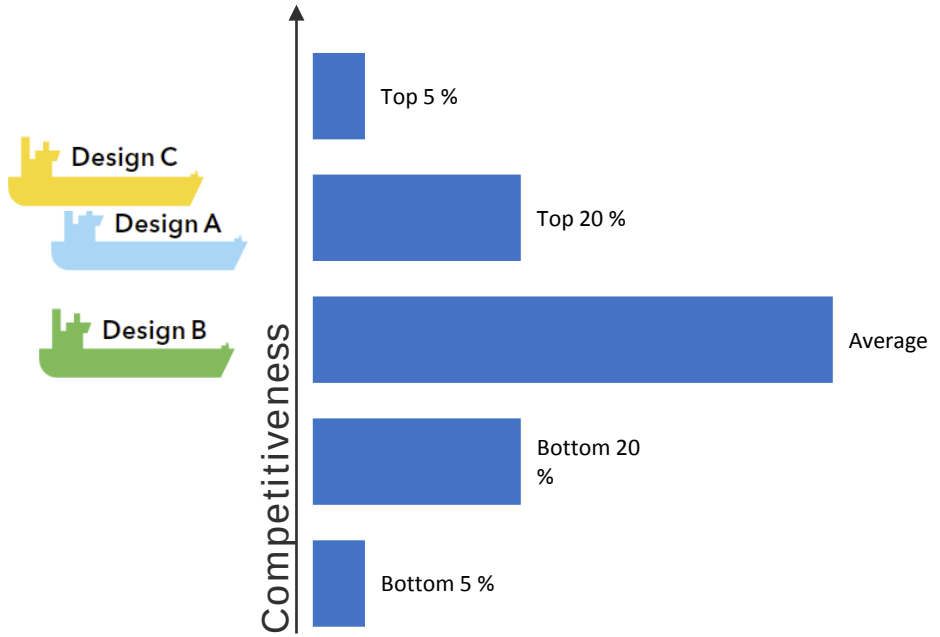
Design B: The LNG-powered ship

- Running on LNG
- Standard newbuild energy-efficiency levels

Design C: The fuel-efficient ship

- Running on MGO/LSHFO
- Enhanced levels of energy efficiency

vs



Fuel prices

HFO/MGO/LNG: 400/600/700 USD/tonne

CO_2 Price

50 USD/tonne from 2030

Competing fleet

2030

Scenario: Bright Green

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

Case study: 55000 dwt bulk carrier – what if the cost of liquid fuels increases?

Your designs

Design A: The standard ship

- Running on MGO/LSHFO
- Standard newbuild energy-efficiency levels

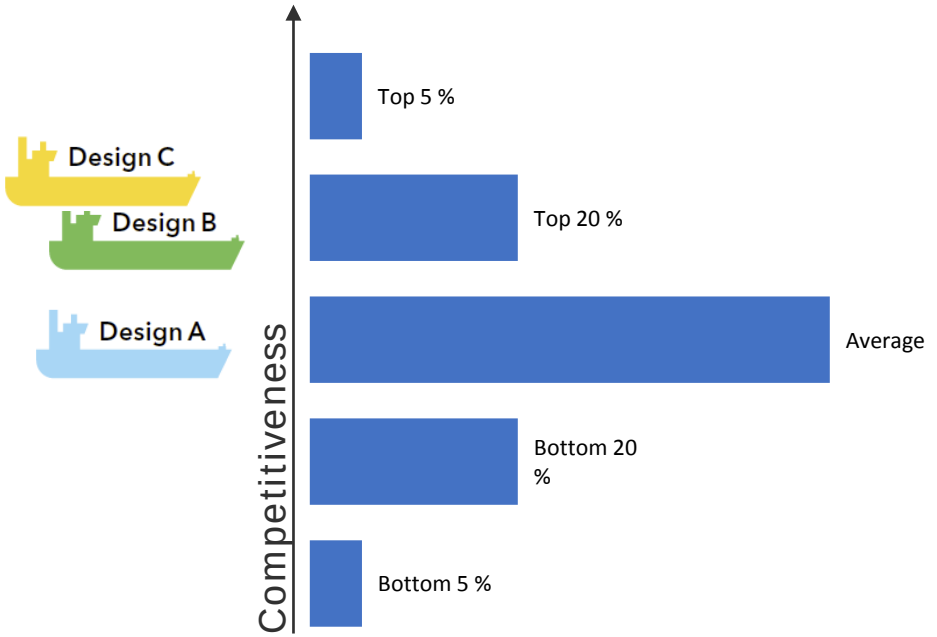
Design B: The LNG-powered ship

- Running on LNG
- Standard newbuild energy-efficiency levels

Design C: The fuel-efficient ship

- Running on MGO/LSHFO
- Enhanced levels of energy efficiency

vs



Fuel prices

HFO/MGO/LNG: 550/750/700 USD/tonne

CO_2 Price

50 USD/tonne from 2030

Competing fleet

2030

Scenario: Bright Green

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

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

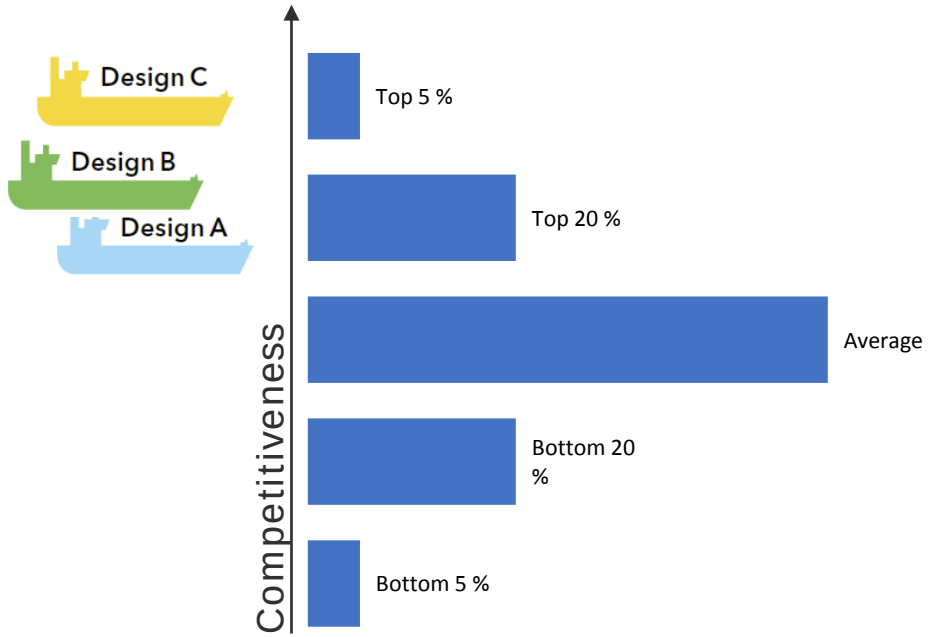
Design B: The LNG-powered ship

- Running on LNG
- Enhanced levels of energy efficiency

Design C: The fuel-efficient ship

- Running on MGO/LSHFO
- Extensive levels of energy efficiency

vs



Fuel prices

HFO/MGO/LNG: 400/600/700 USD/tonne

CO_2 Price

50 USD/tonne from 2030

Competing fleet

2030

Scenario: Bright Green

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

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

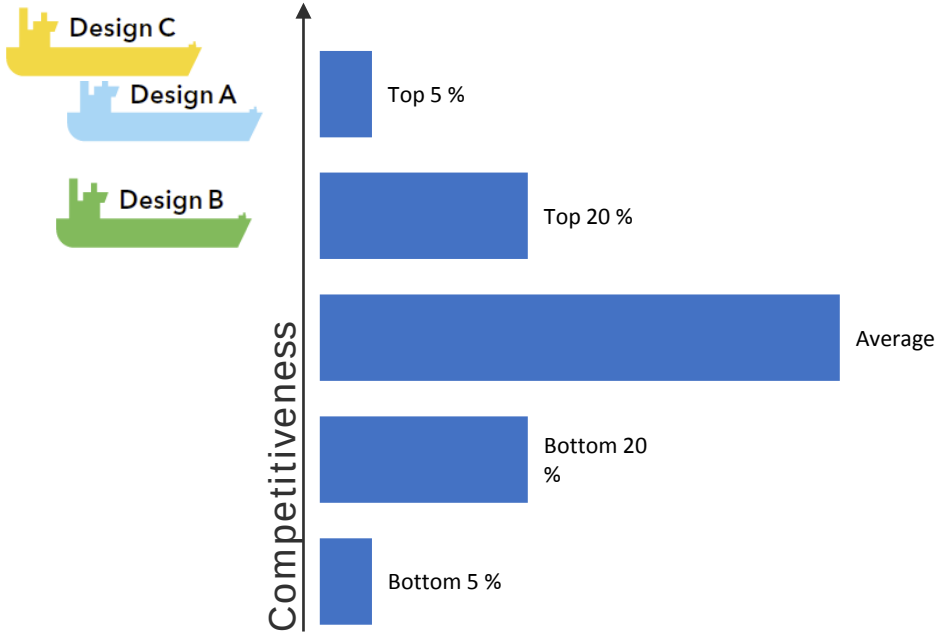
Design B: The LNG-powered ship

- Running on LNG
- Enhanced levels of energy efficiency

Design C: The fuel-efficient ship

- Running on HFO with scrubber
- Enhanced levels of energy efficiency

vs



Fuel prices

HFO/MGO/LNG: 400/600/700 USD/tonne

CO_2 Price

50 USD/tonne from 2030

Competing fleet

2030

Scenario: Bright Green

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

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 it 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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www.dnvgl.com

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