MARITIME ENERGY SOURCES FOR THE FUTURE

Tore Longva, 18 October 2019
Content

Key topics:
- Pathways to decarbonisation
- Fuel transition: Bridging the gap
- Barriers for alternative fuels
The foundation for the outlook is the IMO GHG strategy

Units: GHG emissions

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

Total: Refers to the absolute amount of GHG emissions from international shipping.
Intensity: Carbon dioxide (CO₂) emitted per tonne-mile.

Note that the business-as-usual emissions are illustrative, and not consistent with the emissions baseline used in our modelling (Chapter 6).
Carbon-neutral fuels need to supply 30%–40% of the total energy in 2050.
Fuel mix towards 2050 in the ‘Design requirements’ pathway

In 2050

- Liquefied methane (bio/electro) 41%
- LPG 1%
- Hydrogen 9%
- Ammonia 1%
- Electric from grid 7%
- Advanced biodiesel 4%
- HFO and scrubber 10%
- LSFO or MGO 9%
- Electricity from grid 7%
Fuel flexibility and bridging technologies - the three pillars

**Bridging** technologies can facilitate the transition from traditional fuels, via fuels with lower-carbon footprints, to carbon-neutral fuels.
The Alternative Fuel Barrier Dashboard: Indicative status of key barriers for selected alternative fuels

Barriers exist on many levels for different fuels.

Adoption of alternative fuels depend on:
- demand from charters/cargo owners,
- proactive regulators,
- procurement policies and 
- incentive schemes and international cooperation.

Designer, yard, engine/equipment supplier, shipowner, cargo owner

Feedstock suppliers, fuel suppliers, authorities

Fuel supplier, authorities, terminals, ports

IMO, Class, regional, national

Equipment supplier, designer, yard, incentive schemes

Feedstock supplier, fuel suppliers, competition authorities

R&D, designer

Legend:
- HVO
- LNG
- $\text{H}_2$ (FC)
- $\text{NH}_3$ (ICE)
- Battery
Alternative fuels must evolve over time to increase marked penetration

Gradual steps allow for:
- maturing of technology
- scaling of supply and infrastructure

Not all the options have the potential to reach the deep-sea stage, mainly due to limited energy density.

It took LNG around 20 years to climb all steps. To reach the IMO targets, carbon-neutral fuels must mature faster!
Key findings

Carbon-neutral fuels need to supply at least 30%–40% of the total energy in 2050.

Bridging technologies and fuel flexibility can prepare the fleet for future fuels, smoothing the transition from traditional fuels.

It took LNG around 20 years to mature for deep-sea ships. To reach the IMO ambitions, carbon-neutral fuels must mature faster.