



# Transition to zero emission solutions for shipping in Norway

*IMO Symposium on Alternative low-carbon and zero-carbon fuels for shipping*

*9 - 10 February 2021*

# Norway - a laboratory for the introduction of alternative fuels with investments in infrastructure in parallel



## LNG

IN OPERATION	ON ORDER
58	13

SEVERAL IN THE PIPELINE

## BATTERY

IN OPERATION	ON ORDER
135	70

SEVERAL IN THE PIPELINE

## HYDROGEN

IN OPERATION	ON ORDER
0	1

SEVERAL IN THE PIPELINE

## AMMONIA

IN OPERATION	ON ORDER
0	0

INCREASING INTEREST  
PILOT PROJECT ONGOING

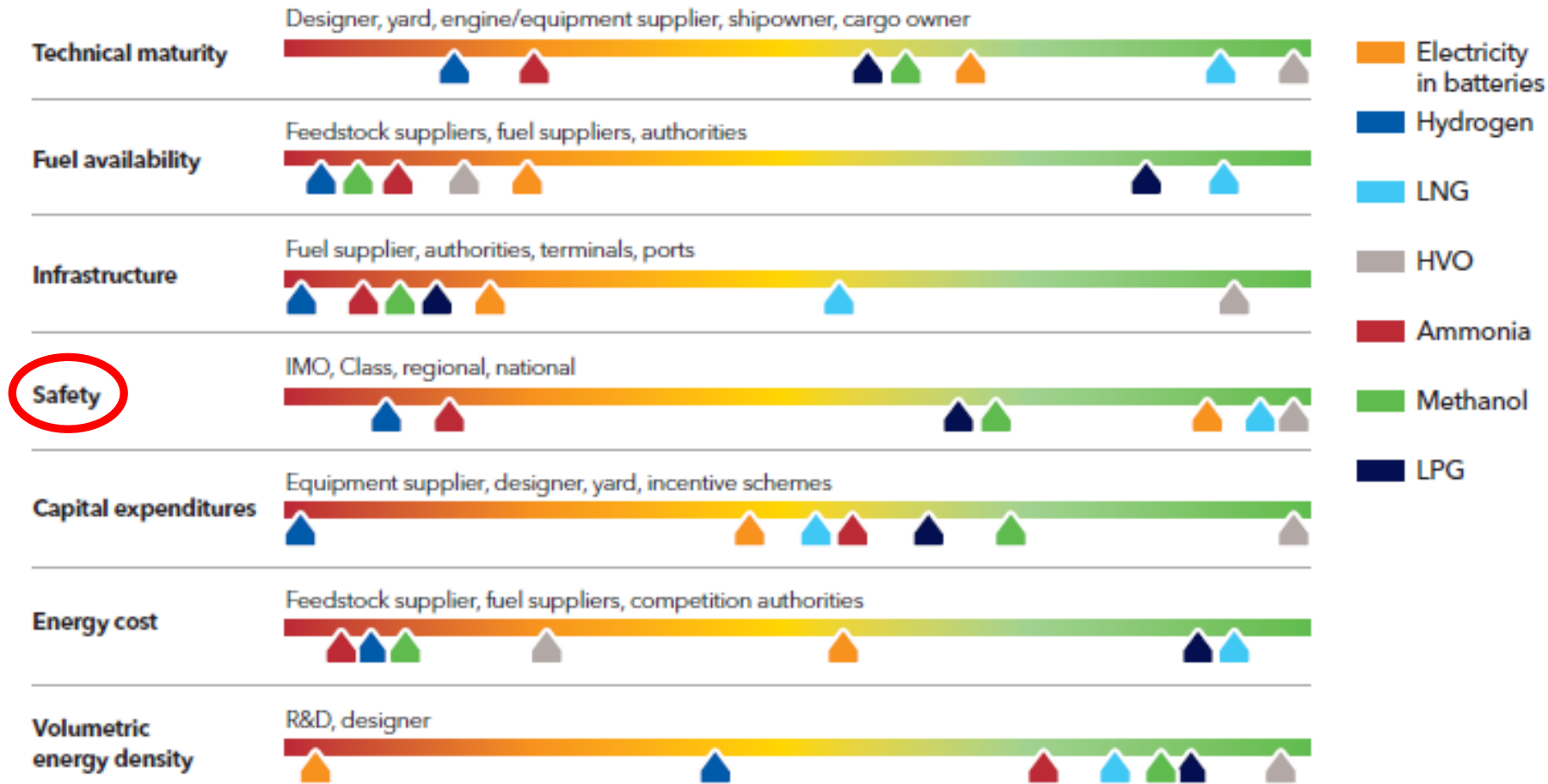
2000

2015

2021



# The Alternative Fuel Barrier Dashboard – indicative status of key barriers for selected alternative fuels in 2020



HVO – hydrotreated vegetable oil;  
 LNG – liquefied natural gas;  
 LPG – liquefied petroleum gas;  
 Hydrogen – carbon-neutral liquefied hydrogen consumed in fuel cells;  
 Ammonia – carbon-neutral ammonia burned in internal combustion engines;  
 Electricity in batteries – full-electric with batteries;  
 Methanol – carbon-neutral methanol burned in internal combustion engines.

## A new generation of carbon-neutral ships - what are the safety challenges?

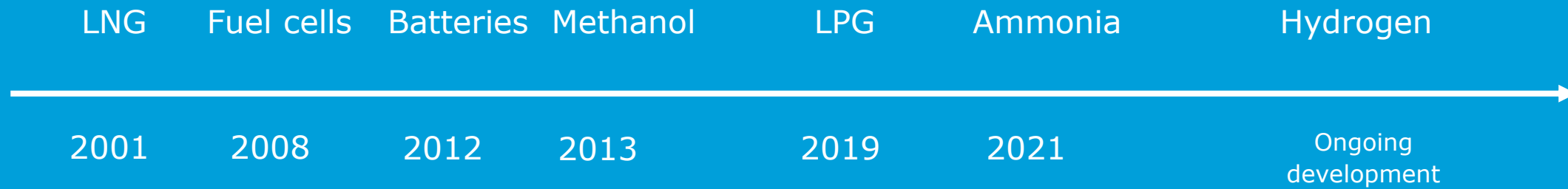
Most non-conventional fuels have properties posing different safety challenges from those of conventional fuel oils.

Additional safety barriers required to maintain the safety level when compared with conventional fuels.

Development of regulations and technical rules for safe design and use onboard ships is required.



# Development of safety rules and regulations in Norway

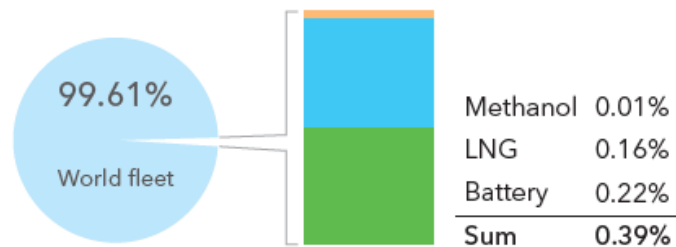


**The continued development of IMO regulations for new fuels is key to enable uptake of alternative fuels in global deep-sea shipping**

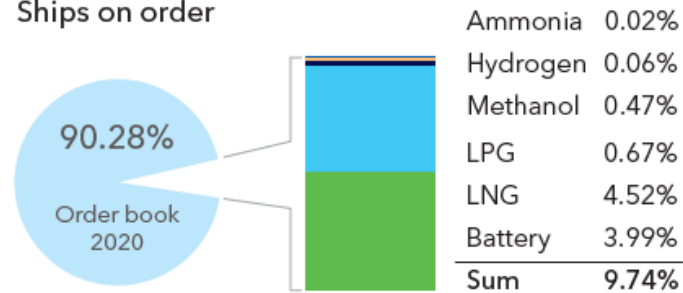
# Alternative fuel uptake in the world fleet is increasing, but limited uptake of zero/carbon neutral fuels towards 2030

## Alternative fuel uptake (percentage of ships)

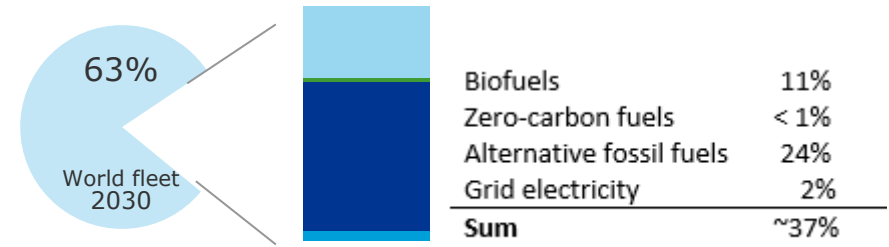
Ships in operation



Ships on order



2030 IMO compliance scenario



- **Less than 1% of the existing fleet is running on alternative fuels**
- **10% of current newbuilds are ordered with alternative fuel systems**
- **Pathway modelling indicates need for more than 30% alternative fuels in 2030**
  - Uptake and fuel mix depends on the scenario; 1 of the 12 IMO compliance scenarios is shown in the figure

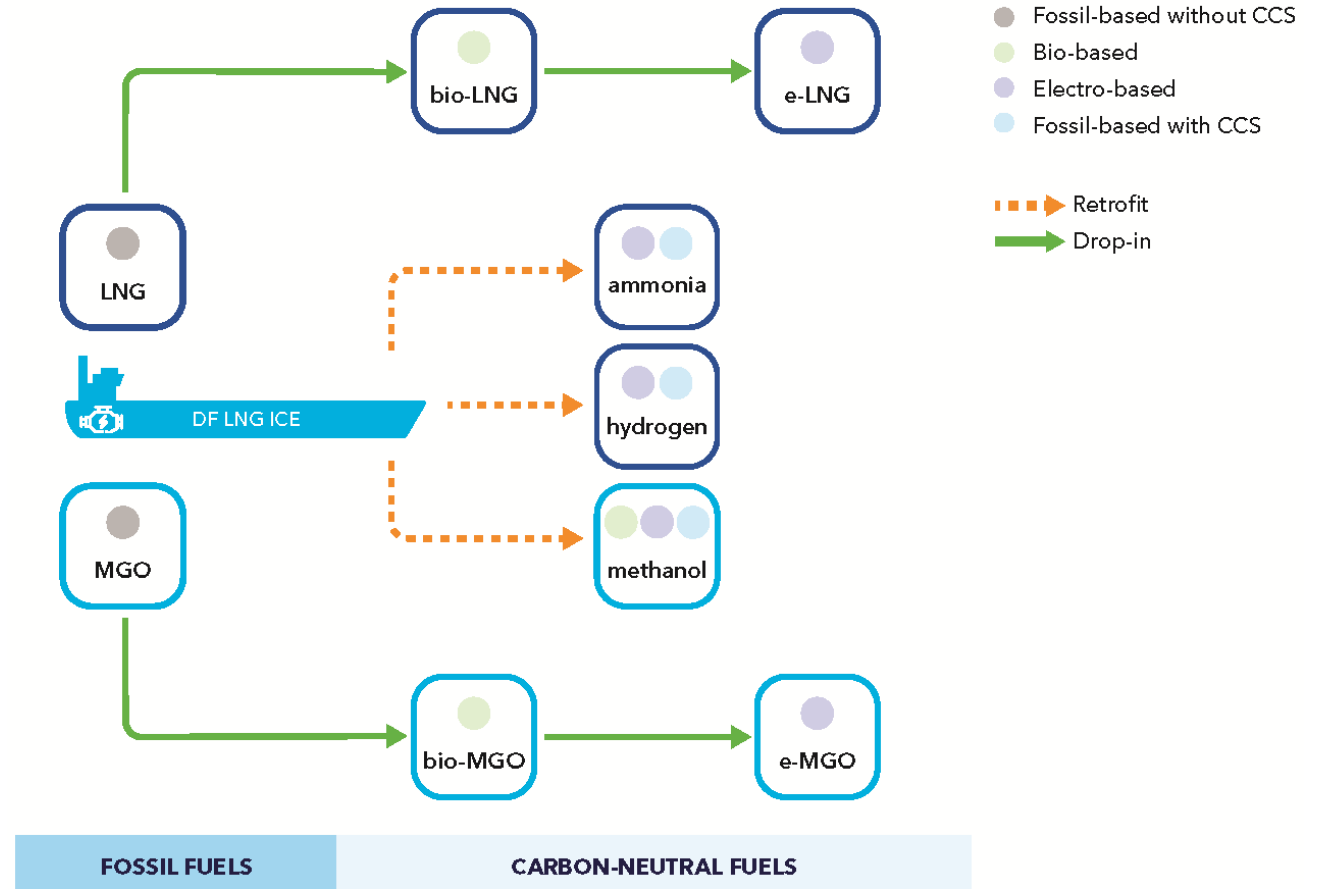
# Fuel flexibility, alternative fuel-ready or wait and see?

All alternative fuels have barriers and challenges.

Resolving these barriers will take a long time.

Fuel flexibility and alternative fuel-ready solutions can:

- Ease the transition, and
- minimize the risk of investing in stranded assets.





# New fuels and technologies maturing in short-sea shipping for later use in deep-sea shipping





**For more information visit:**

**[www.dnvgl.com/maritime/insights/topics/decarbonization-in-shipping](http://www.dnvgl.com/maritime/insights/topics/decarbonization-in-shipping)**

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