

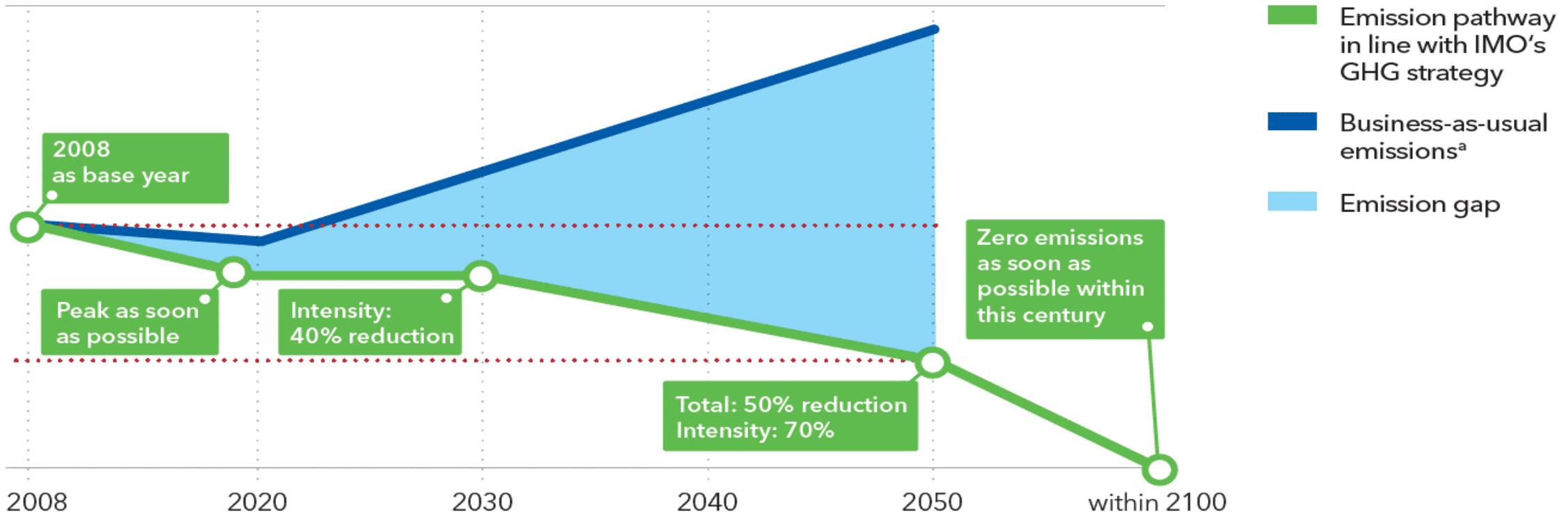
Ammonia Energy Conference 2020

Ammonia Infrastructure

Anthony Teo
18 November 2020



Initial IMO Strategy on reduction of GHG emissions - vision and ambitions



Short-term 2018 – 2023

- Tighter EEDI, SEEMP, EEXI ?
- Energy efficiency indicators
- Speed reduction
- National Action Plans

Mid-term 2023 - 2030

- Energy efficiency measures for new and existing ships, using new indicators
- Carbon pricing / Market based measures
- Plan for low carbon fuels

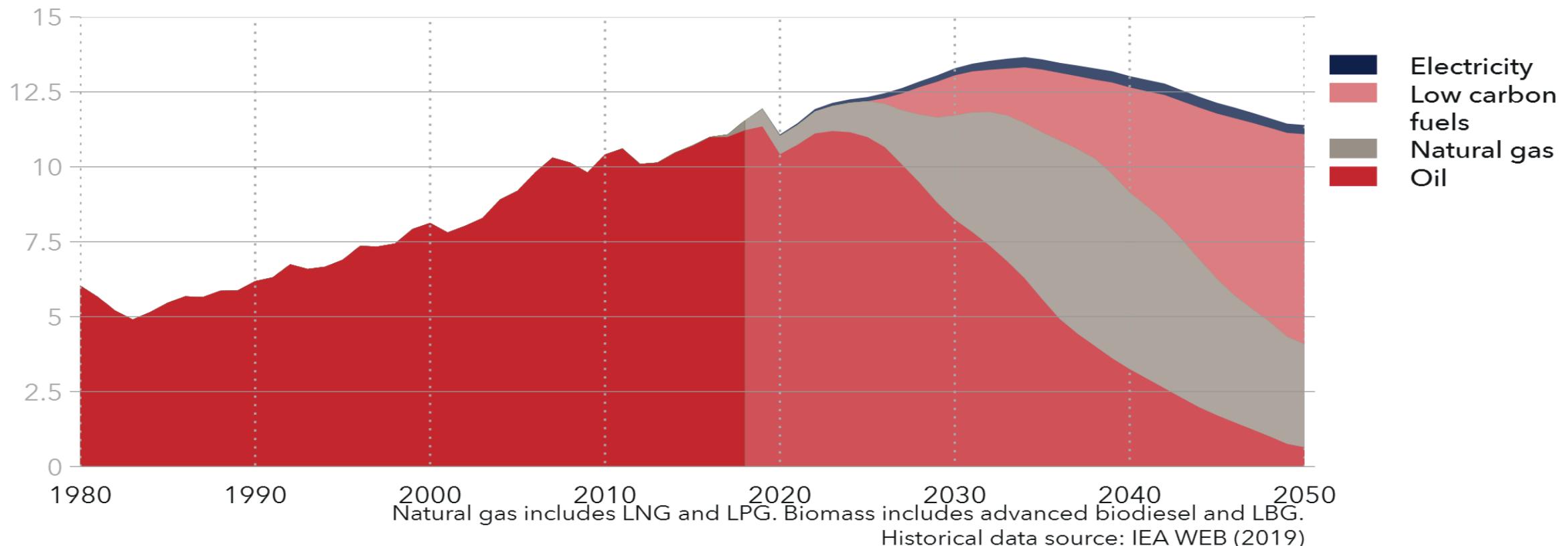
Long-term 2030 →

- Development of carbon neutral / zero carbon fuels
- New/innovative emission reduction mechanisms

The maritime fuel mix will change dramatically

World maritime subsector energy demand by carrier

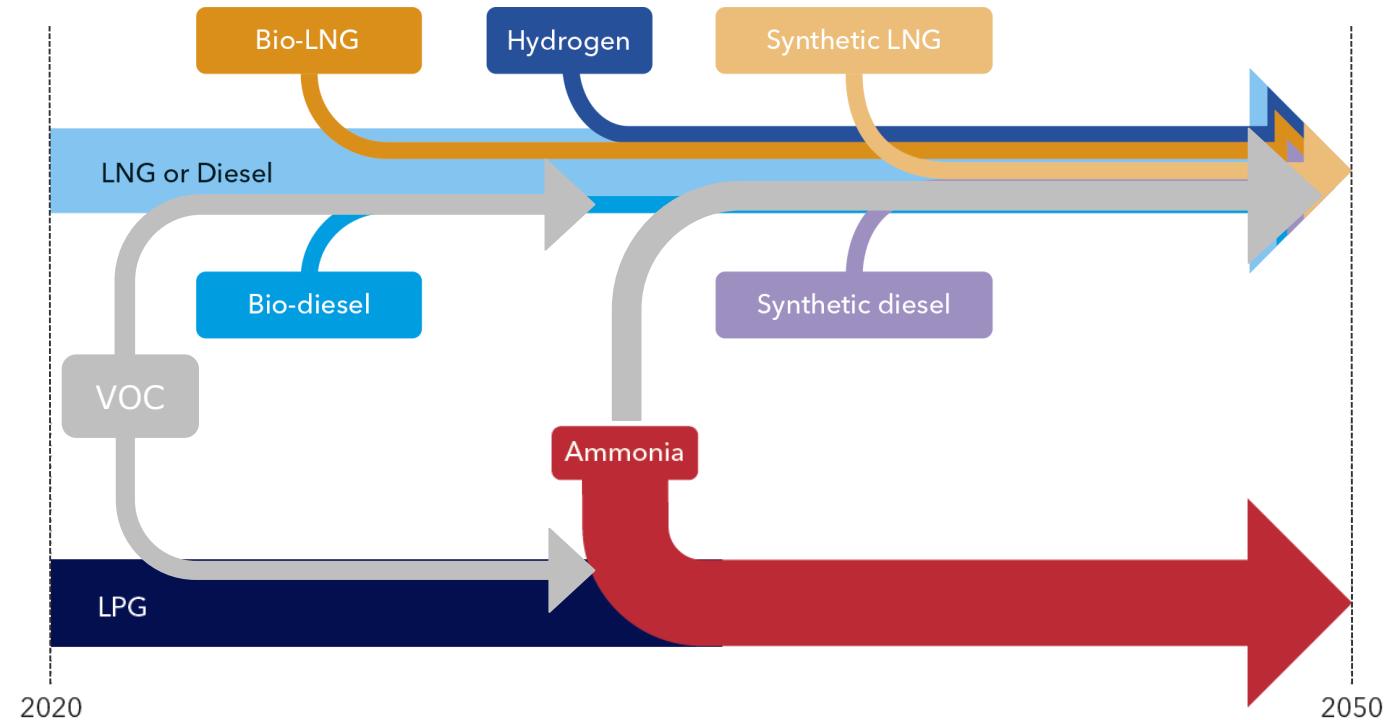
Units: EJ/yr



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





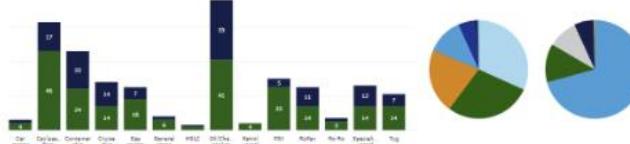
Welcome to DNV GL's Alternative Fuels Insight platform

Map



Explore the development of bunkering infrastructure for alternative fuels. You can also see where ships using alternative fuels and technologies are already operating.

Statistics



Get detailed insights to the uptake of alternative fuels and technologies on ships. Filter on ship types, region, technology and more to create your own graphs.

Supporters

The AFI platform is made possible by co-funding from our supporters.

They include industry pioneers and market leaders who see the importance of alternative fuels in the maritime industry. Here you can learn more about them and get in touch with their experts.

Fuel Finder

Connect instantly with suppliers of alternative fuels by submitting your own bunker request.

Encyclopedia



Learn more about the properties of a wide range of alternative fuels and technologies.

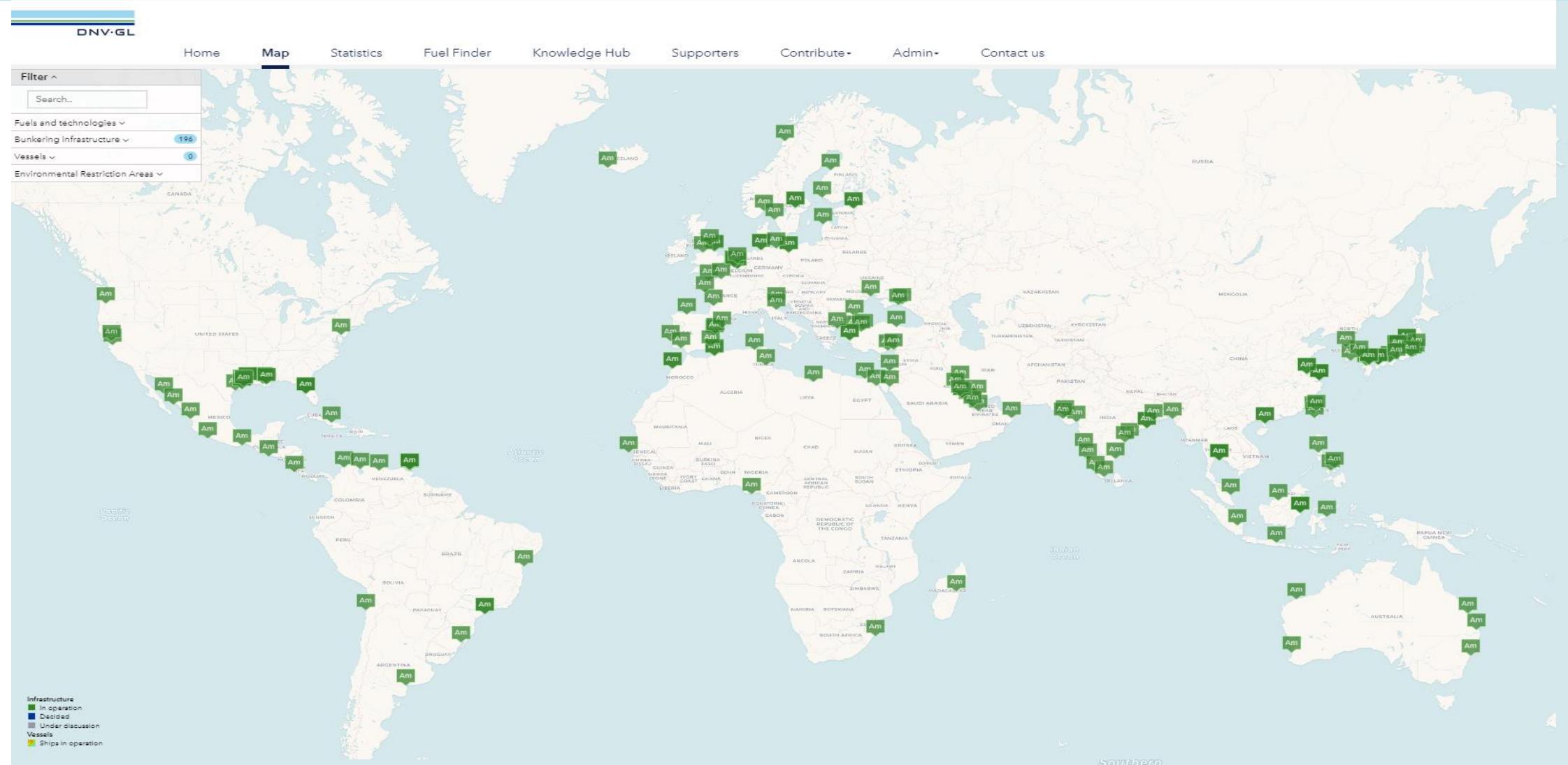
Fuel Selector

Compare the financial performance of LSFO, HFO with scrubber, LNG, LPG and methanol for your ship. Use DNV GL's assumptions or apply your own to calculate lifecycle costs, payback time and

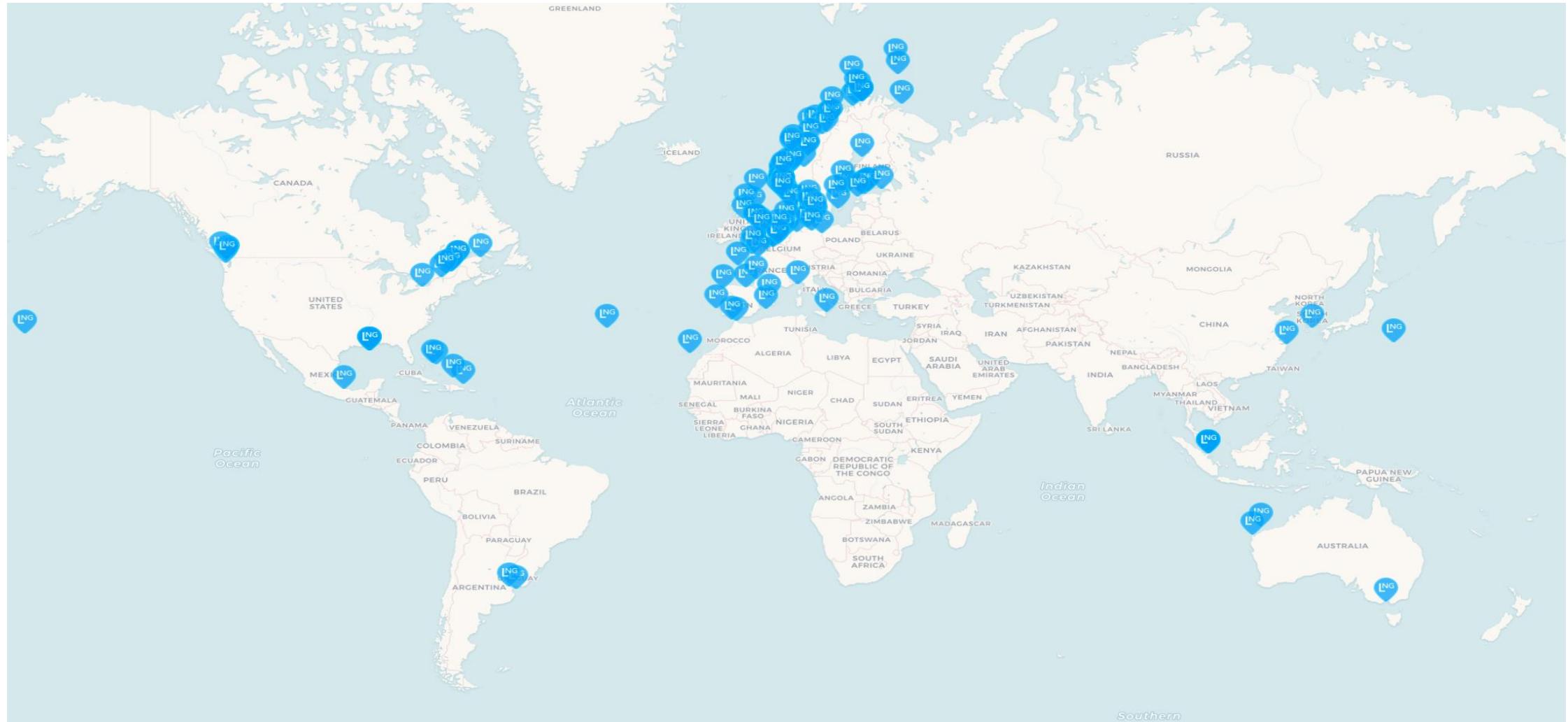
- **A freely available platform** on alternative fuels and technologies
- **Interactive map and statistics** with current status on ship uptake and bunkering infrastructure
- **Fuel Finder** lets ship owners connect with suppliers of alternative fuels for specific projects
- **Encyclopedia** with environmental, technical and financial information on a wide range of fuels and technologies
- **Alternative fuels benchmarking tool** to compare financial performance of alternative fuels for a specific project

AFI enables users to navigate a constantly changing landscape on alternative fuels through comprehensive, up to date and objective information

LNG / Ammonia infrastructure is being developed to supply the growing fleet

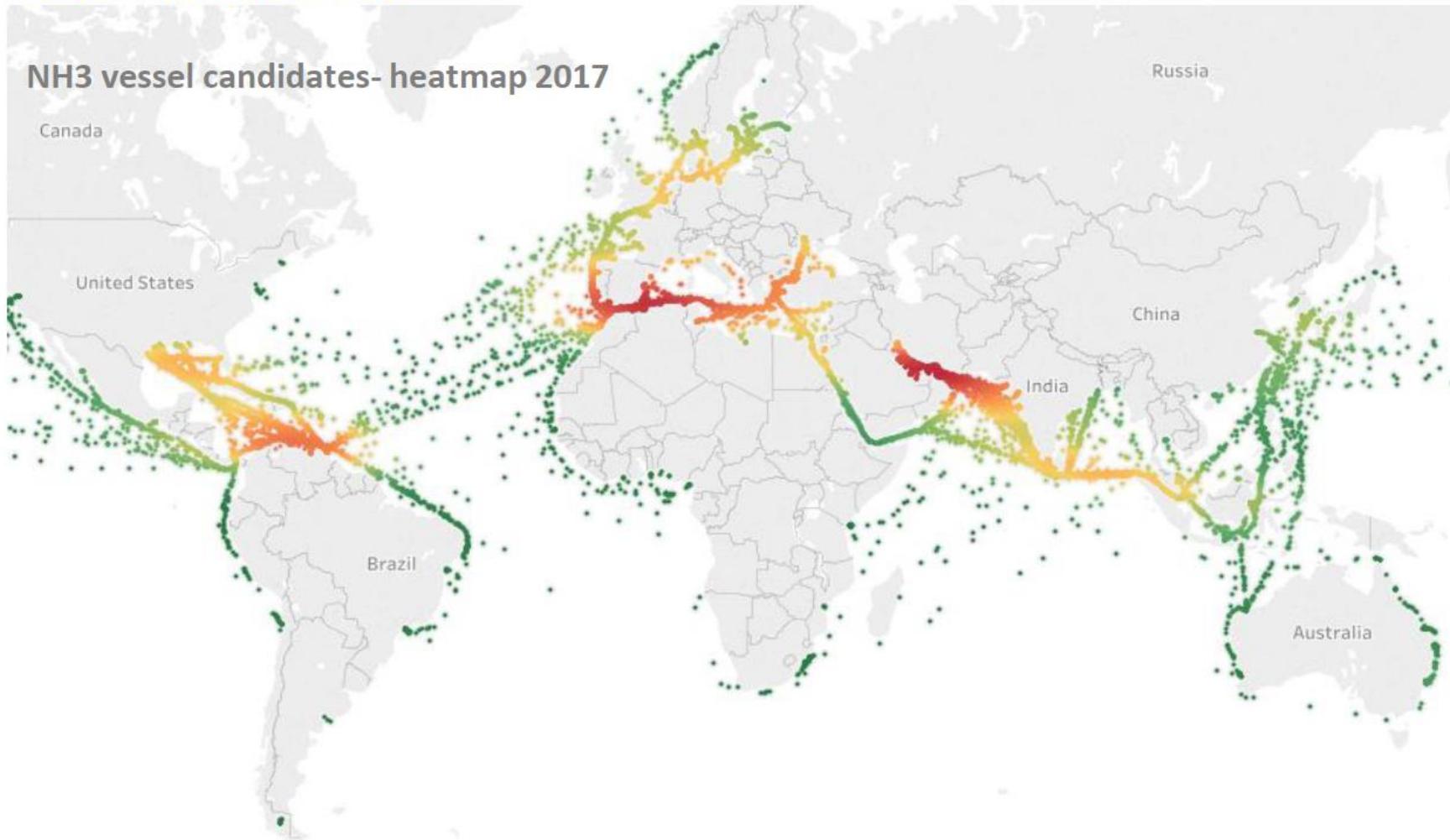


LNG fuelled ships are already covering a large area



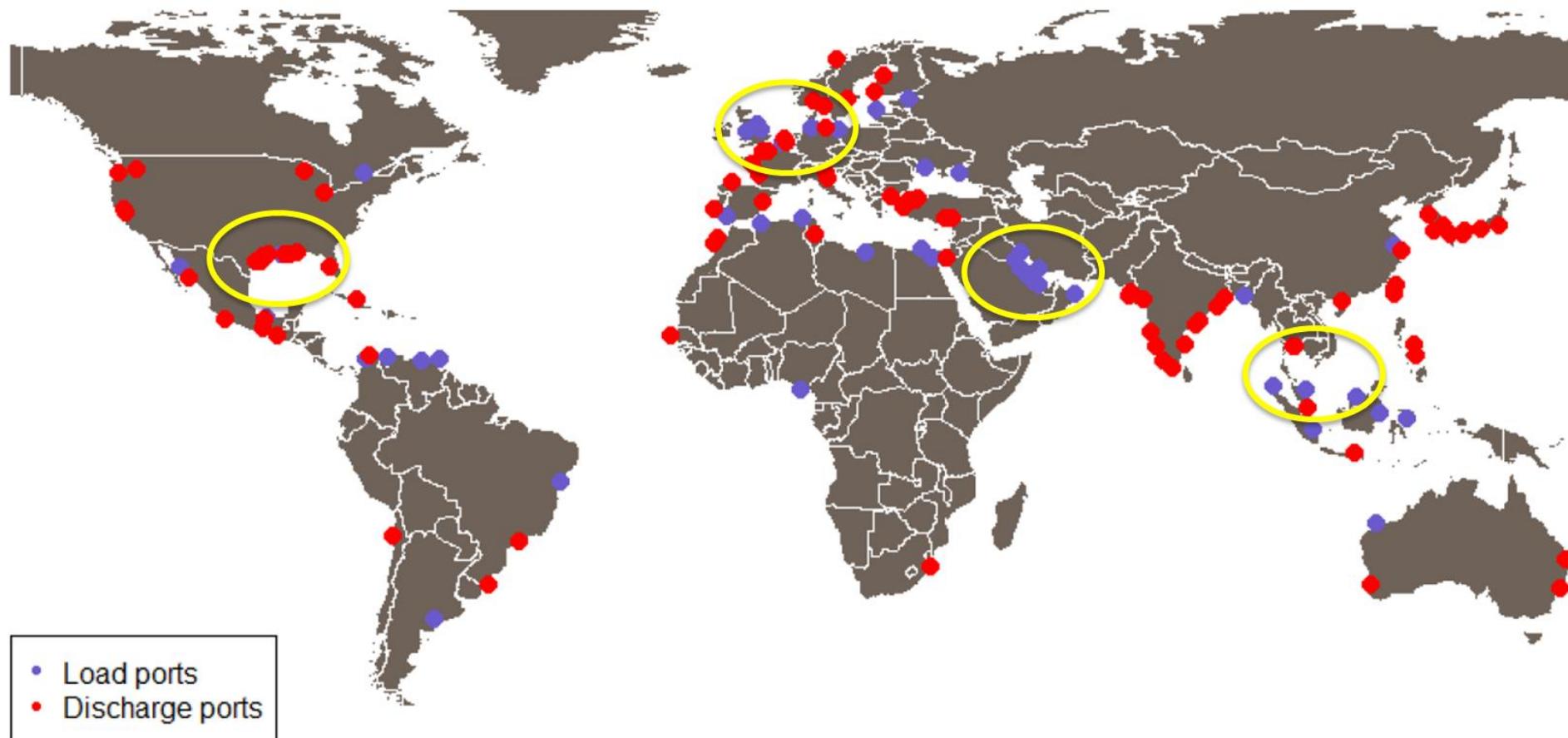
Ammonia shipborne trade

Vessel Movements 2017



Ammonia port (potential) bunkering infrastructure

Worldwide ammonia ports



Alternative Fuels Insight - afi.dnvgl.com

White paper - Ammonia as a Marine Fuel

Decarbonization in shipping



Green ammonia
CO₂ emission-free
(from renewable
electricity)



Brown ammonia
Fossil sources
like natural gas
and coal



Blue ammonia
Fossil sources with
carbon capture
and storage (CCS)

