

SEA-LNG

Decarbonising the shipping industry

Bio360 Expo 2024, Nantes

25th January 2024



The shipping industry

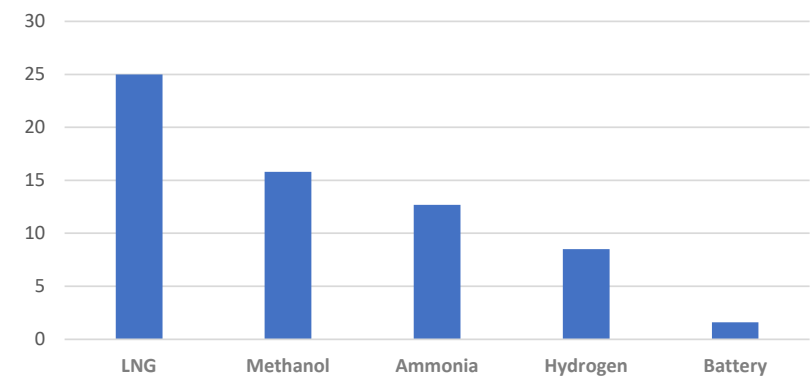
The decarbonisation challenge

SEA-LNG

- One of the most difficult sectors to decarbonize
- It is not 'one size fits all'
 - Short sea vs deep-sea shipping
- Pre-requisites for renewable and low-carbon fuels
 - High energy density
 - Utterly reliable
 - Completely safe
- Decarbonisation needs to happen at unprecedented speed

	LNG	Methanol	Ammonia	Hydrogen	Battery
Energy density	Dark Green	Dark Green	Yellow	Orange	Red
Technology maturity	Dark Green	Light Green	Orange	Orange	Yellow
Safety	Dark Green	Light Green	Red	Orange	Dark Green
Fuel supply infrastructure	Light Green	Orange	Red	Red	
Fuel availability (green)	Orange	Red	Red	Red	

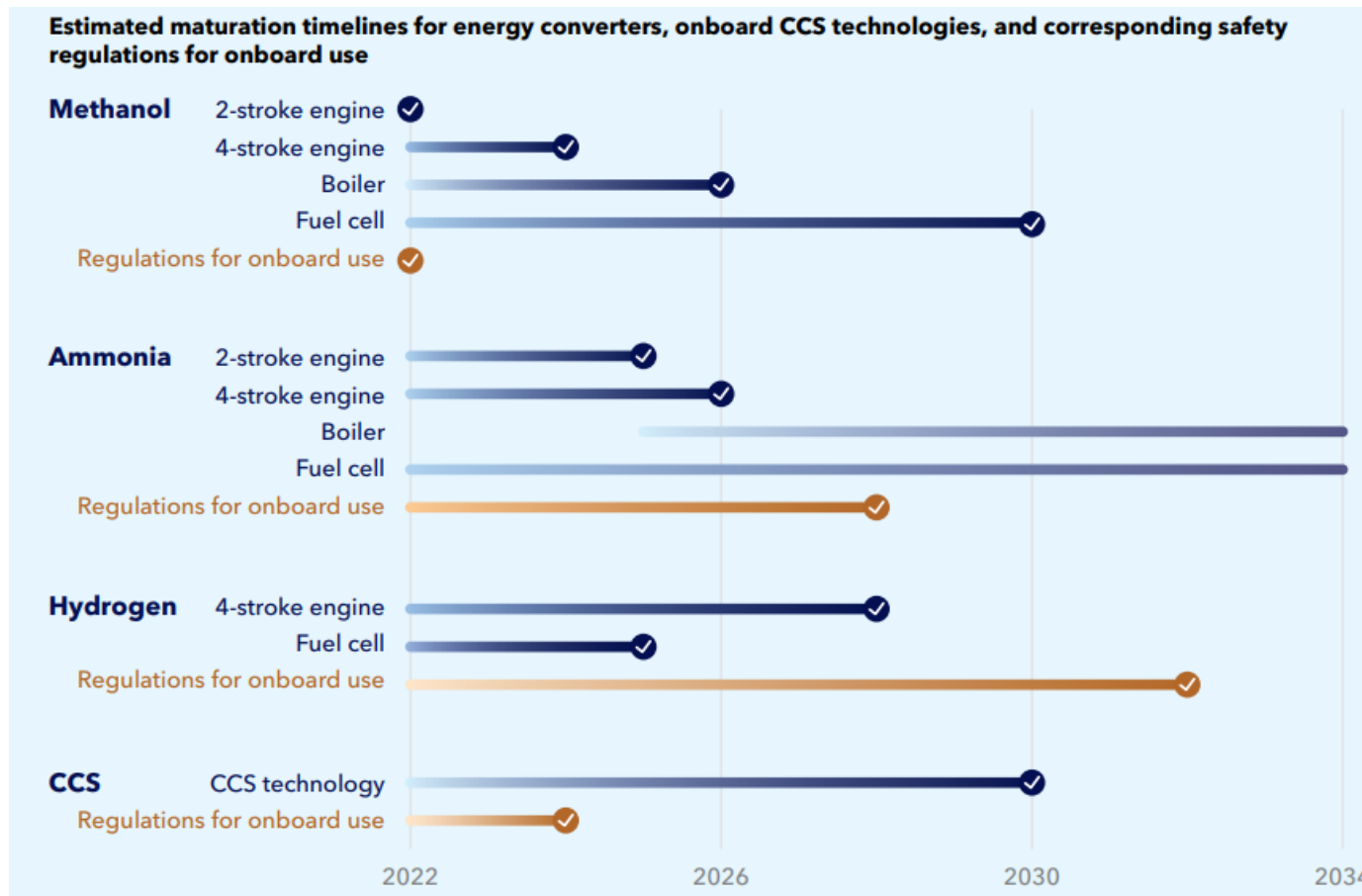
Volumetric energy density of different fuels (GJ/cum)



Alternative fuels

Technology availability and regulatory timelines

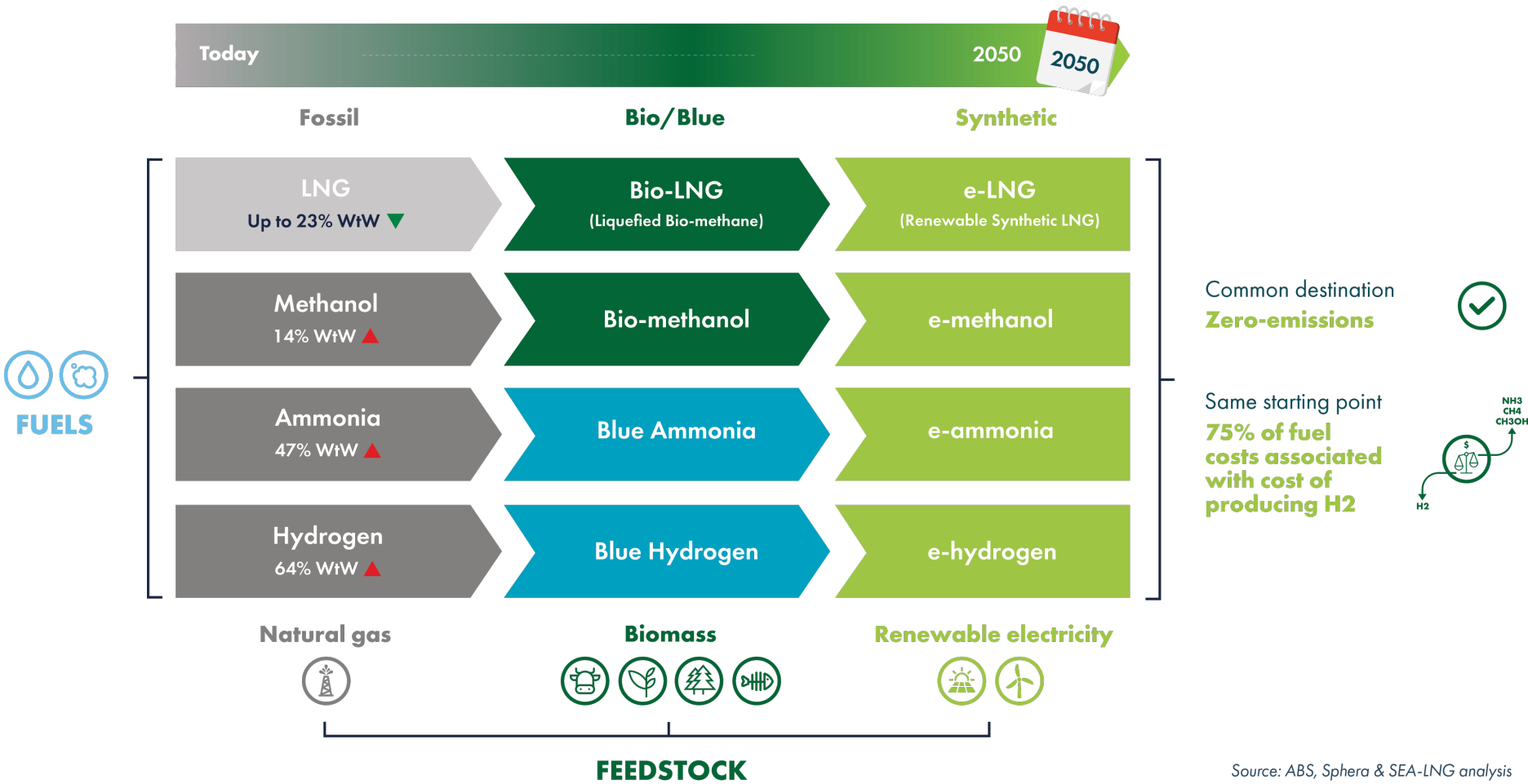
SEA-LNG



Source: DNV Maritime Forecast to 2050, 2022

Decarbonisation

Need to compare ‘apples with apples’

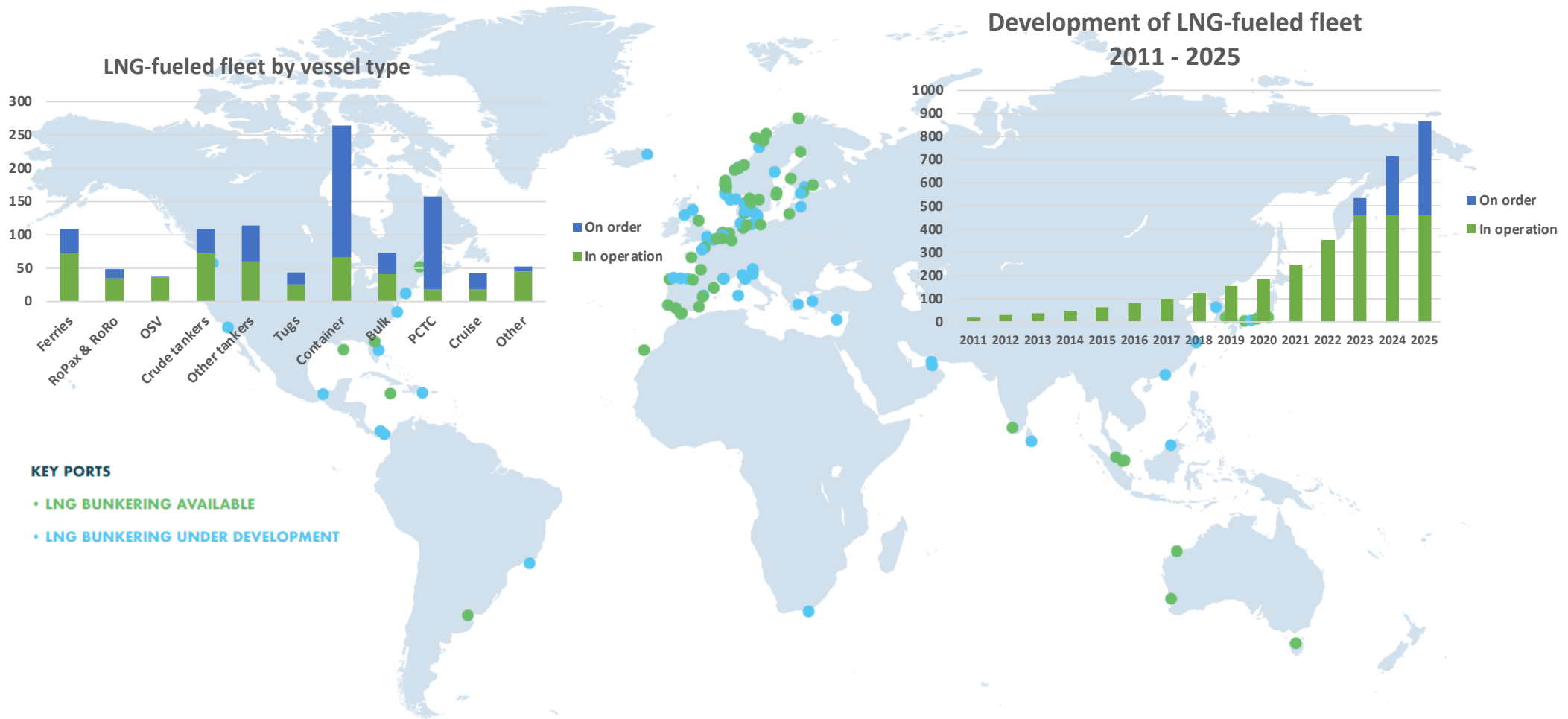


Source: ABS, Sphera & SEA-LNG analysis

Status of LNG as a marine fuel

SEA-LNG

Rapidly growing numbers of LNG-fuelled ships & bunkering infrastructure

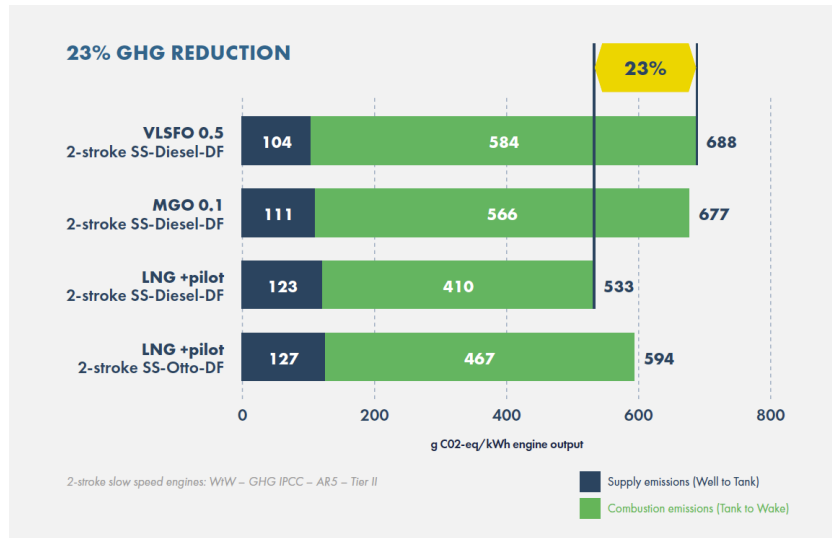


Sources: DNV Alternative Fuels Insight & SEA-LNG analysis

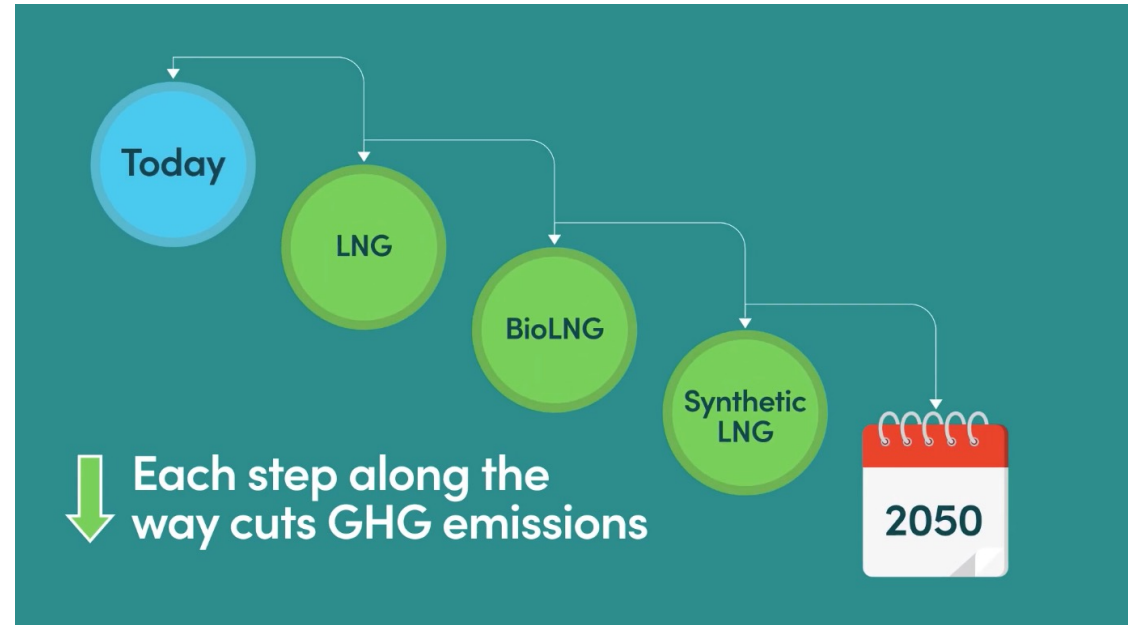
LNG decarbonisation pathway

GHG reductions now and a zero-emissions destination

SEA-LNG



Source: Sphera study, <https://sea-lng.org/news-views/>

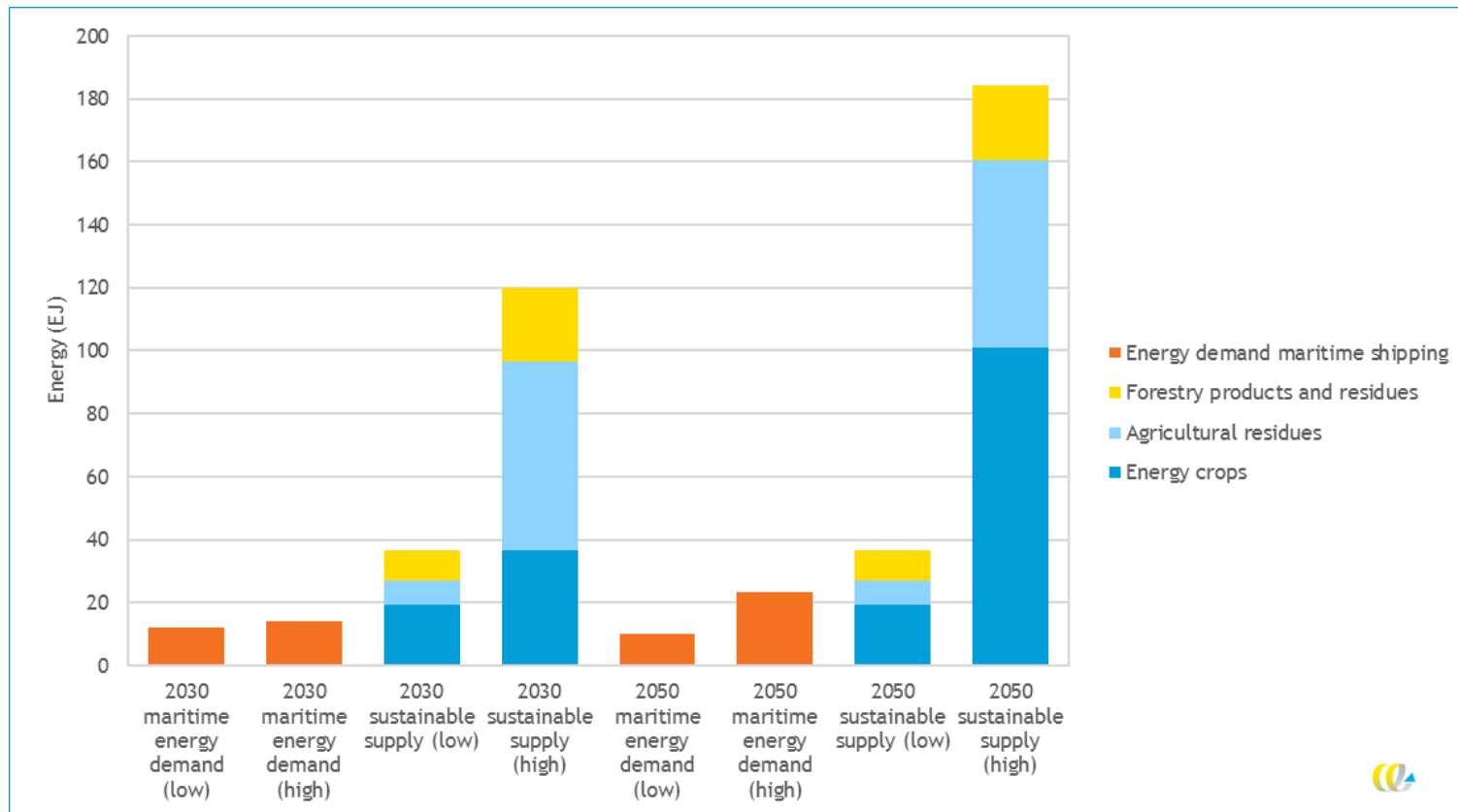


- LNG pathway
 - Starts today – immediate GHG emissions reductions
 - Continues with bio-LNG & renewable synthetic LNG (e-LNG)
 - Low risk and incremental
 - Uses existing infrastructure and ships – no stranded assets

Bio-LNG as a marine fuel

Unrealised potential

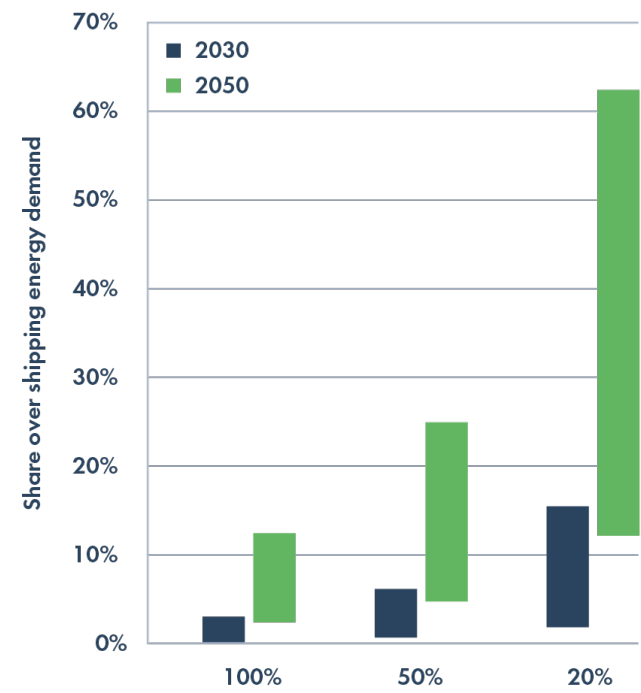
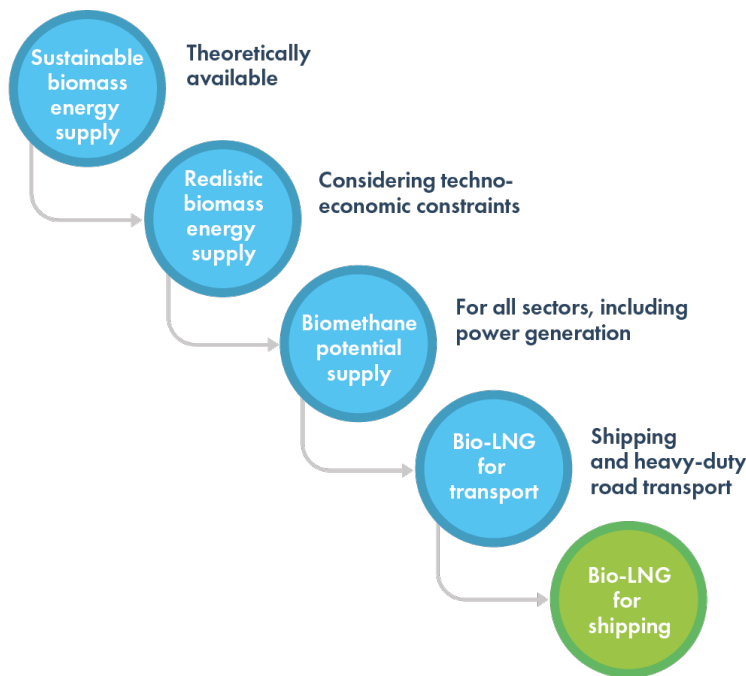
Maritime energy demand vs max sustainable BioLNG supply in 2030/50



Source: CE DELFT study, <https://sea-lng.org/our-work>

Bio-LNG as a marine fuel

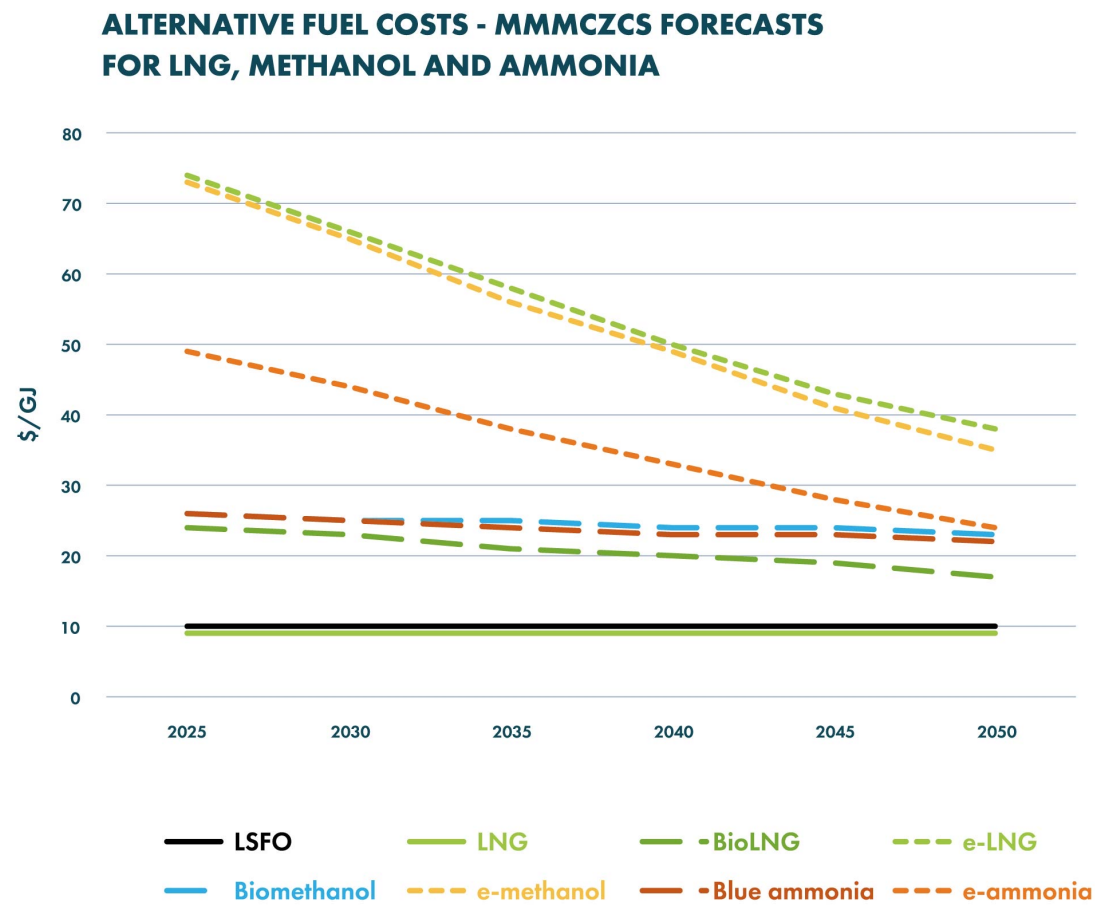
Realistic availability



Source: MESD: Role of bio-LNG in shipping industry , October 2022

Bio-LNG as a marine fuel

The lowest cost alternative fuel

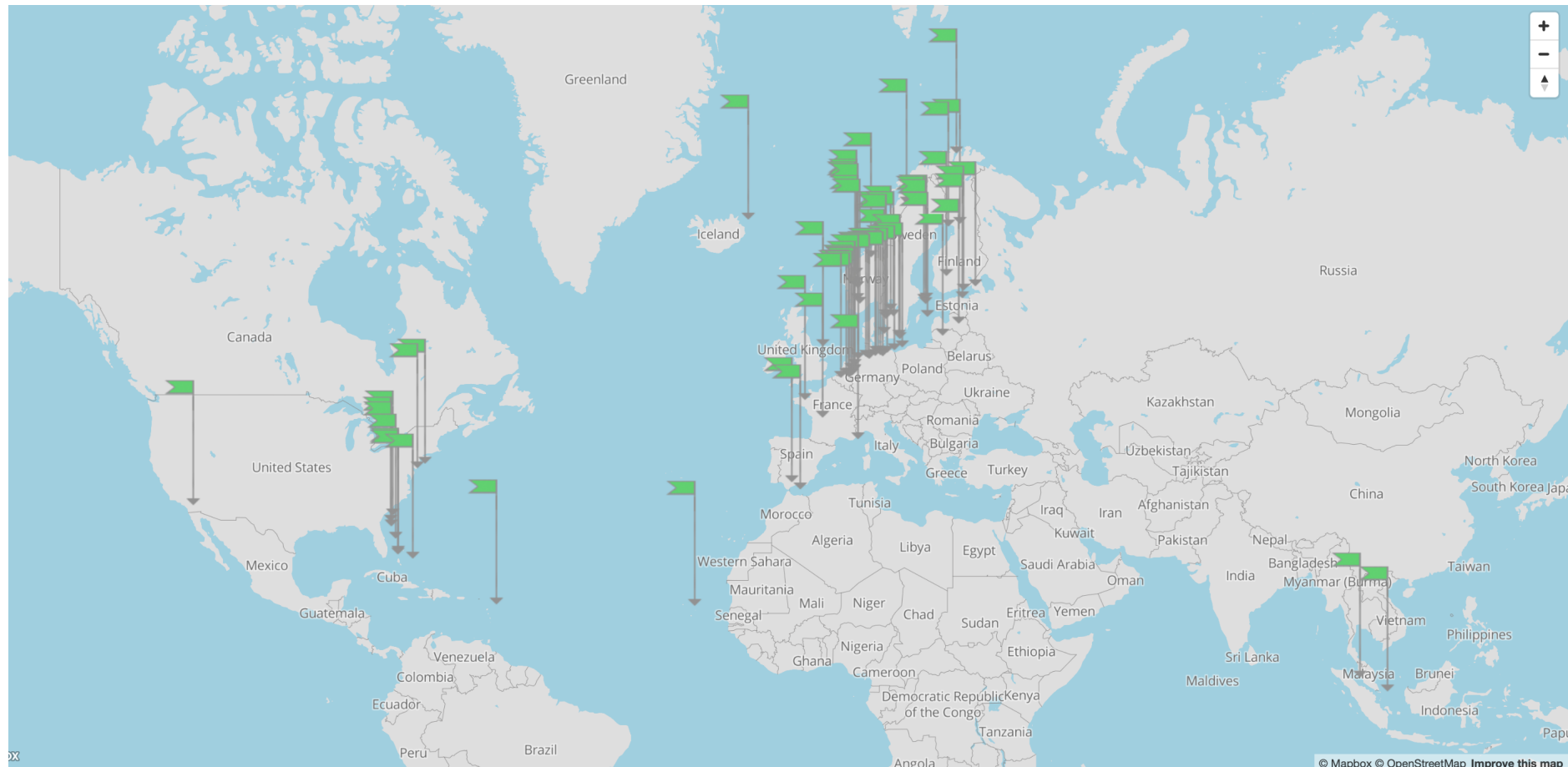


Source: MMMCZCS

Bio-LNG as a marine fuel

Commercially available today

SEA-LNG



Source: SEA-LNG

e-LNG as a marine fuel

The future?

SEA-LNG



Source: SEA-LNG

Summary

SEA-LNG

Bio-LNG and e-LNG: a robust pathway to zero emissions for shipping

- Mature and commercially available technologies for fuel production and use on-board ships.
- Rapidly growing fleet of LNG-fuelled vessels which can use bio-LNG / e-LNG as a drop-in fuel.
- Existing and growing infrastructure for transportation and bunkering.
- Significant global supply potential of bio-LNG as a marine fuel.
- Competitive cost compared to other sustainable biofuels and electro-fuels.
- Commercially available now.
- Paves the way for full decarbonisation through e-LNG.