

# SEA-LNG

## LNG for Maritime Transportation: a Global Perspective

AAPA – Harbors & Navigation Committee

18th November, 2020



# Our Membership

Industry-leading companies from across the globe who share our vision for and are committed to LNG as a marine fuel for cleaner shipping.



# Whole Value Chain Represented





# Our Strategy

1. **Develop independent, fact-based analysis** on the commercial, environmental and operational benefits of LNG as a marine fuel
2. **Communicate our work** to all stakeholders in the global shipping industry
3. **Undertake targeted engagements** with key decision-makers in industry, the finance sector and regulatory bodies

We do this by working collaboratively with our highly impactful membership, other industry associations, academic institutions, policy makers and the wider maritime community





# Providing Answer to Key Issues



Emissions



Decarbonisation



Commercial



Availability



Bunkering



Safety



Consumer Pressure



Global Fleet

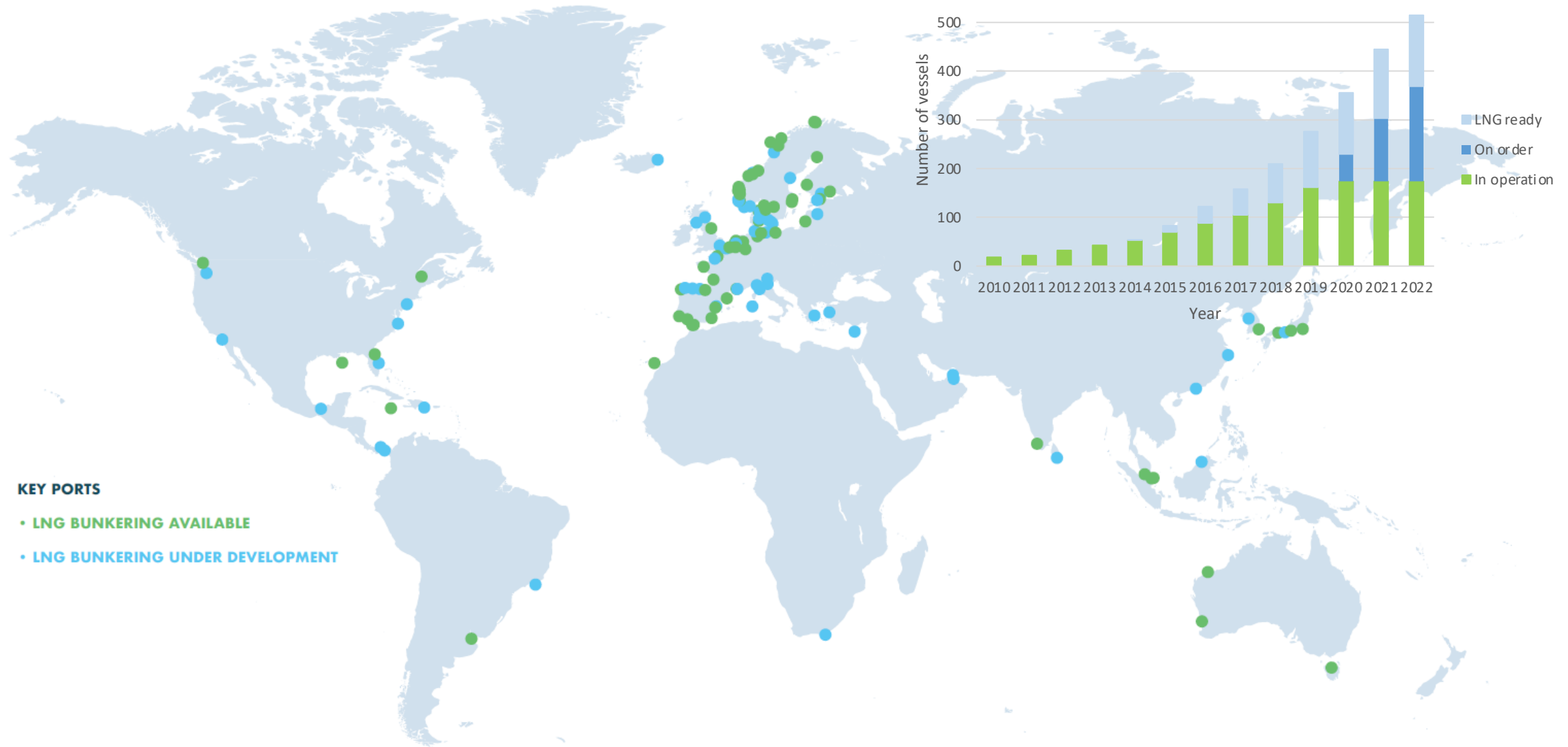
# Key messages

## Drawn from our research

- Unparalleled local emissions benefits (SO<sub>x</sub>, NO<sub>x</sub> & PM)
- Delivers immediate GHG emissions reductions, now
- Methane slip is a recognized issue and is being addressed
- Commercially viable and operationally proven
- Provides a pathway for long term decarbonisation via liquefied bio- and synthetic methane
- No magic bullet for shipping industry decarbonisation – all options need to be on the table
- LNG is complementary to the development of other Alternative Fuels such as ammonia and hydrogen



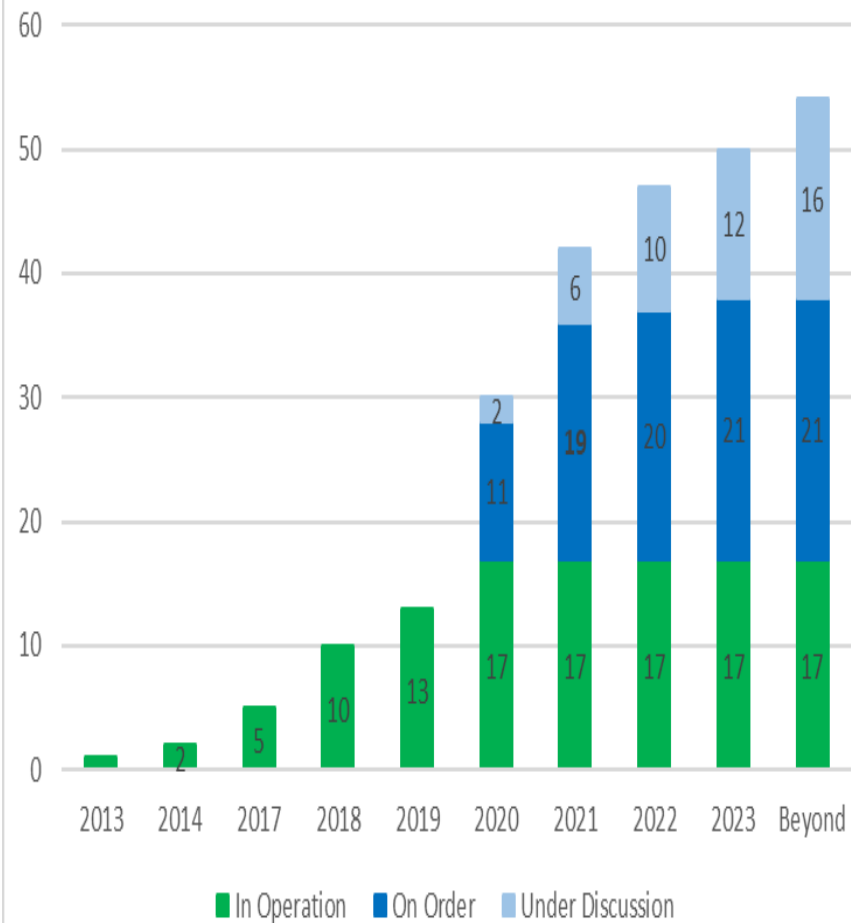
# LNG uptake as a marine fuel is accelerating



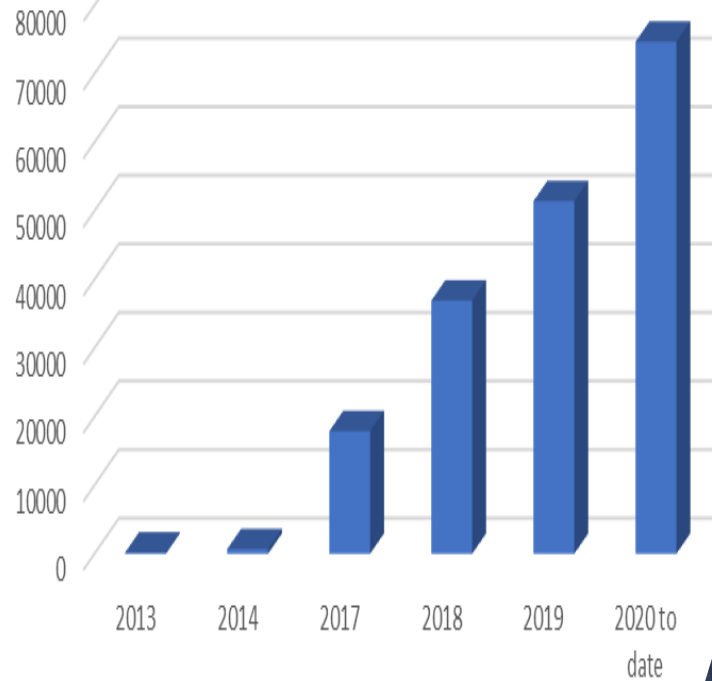


# LNG: increasing BV capacity

Bunker Vessel Development



Bunker Vessel Capacity m3



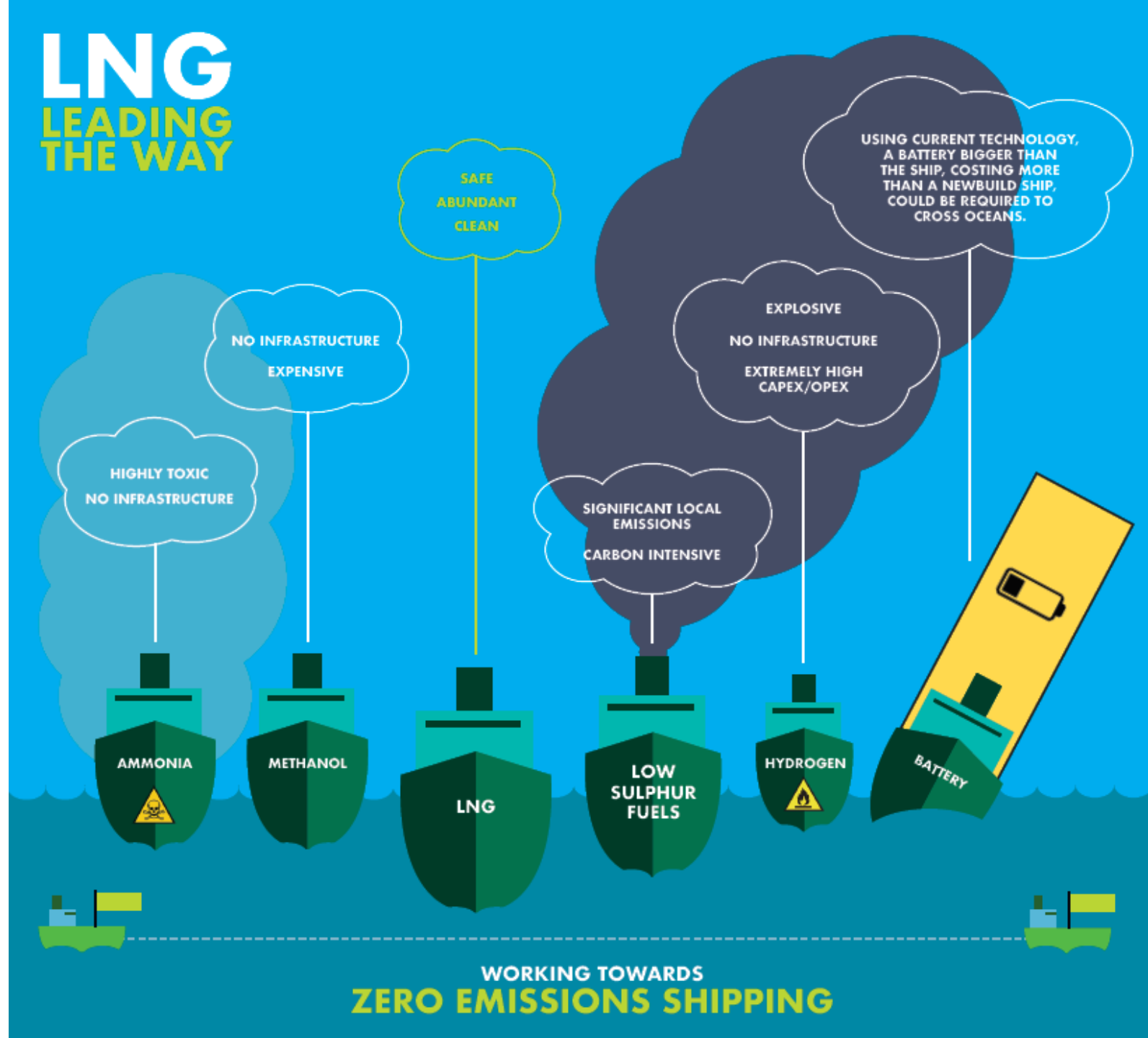
Source DNV-GL: <https://afi.dnvgl.com/Statistics?repld=5>



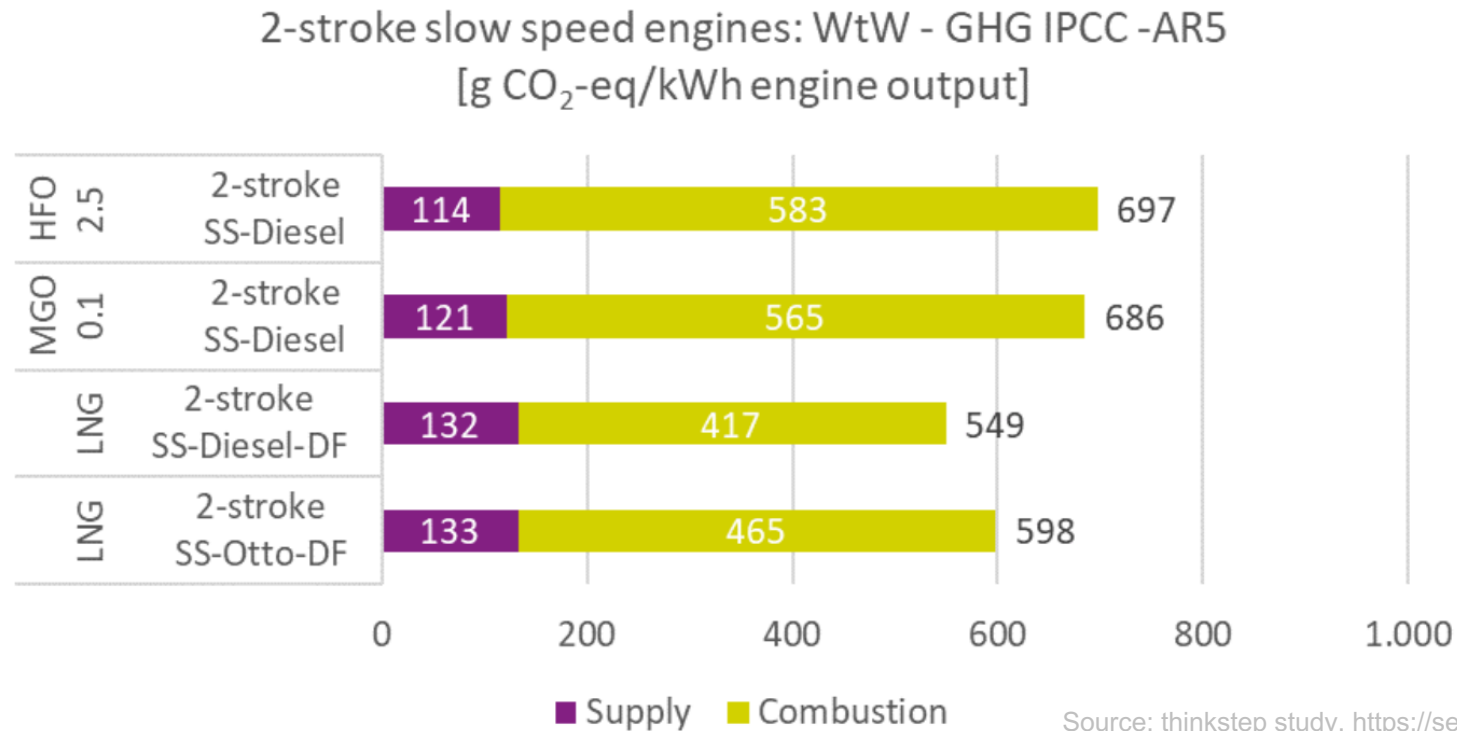
# Waiting no option

## LNG engine technology is:

- safe, with millions operating hours experience
- mature, used as a marine fuel for over 50 years
- commercially viable, readily available
- scalable, bunkering available at major ports
- fully compliant with ECAs around the world
- no ocean contamination from marine fuel spill accident
- eliminates SOx pollution preserving human health
- reduces NOx emissions by 95%, Particulate Matter emissions by nearly 99%
- cuts GHG emissions by up to 21% on well-to-wake basis, 28% on a tank-to-wake basis
- zero-emissions potential through bio and synthetic sources of gas



# LNG offers immediate GHG emissions reductions

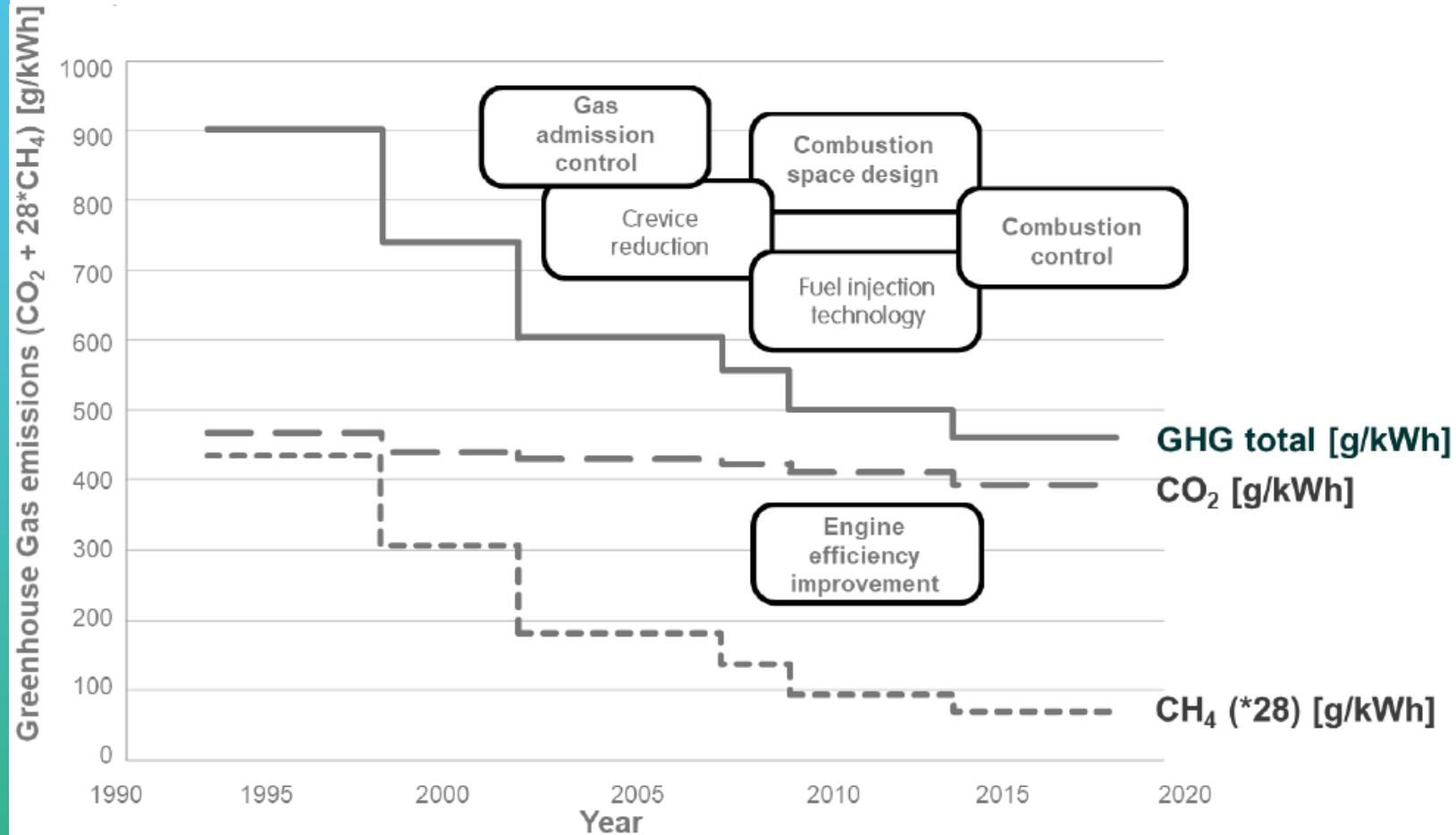


- Up to 28% reduction in GHG emissions on a Tank-to-Wake basis inclusive of methane slip
- LNG plus EEDI improvements can meet IMO 2030 decarbonisation target for new builds
- Further reductions available with bioLNG as a drop-in fuel



# OEMs addressing CH<sub>4</sub> slip

## GHG emission reductions 1998- 2018

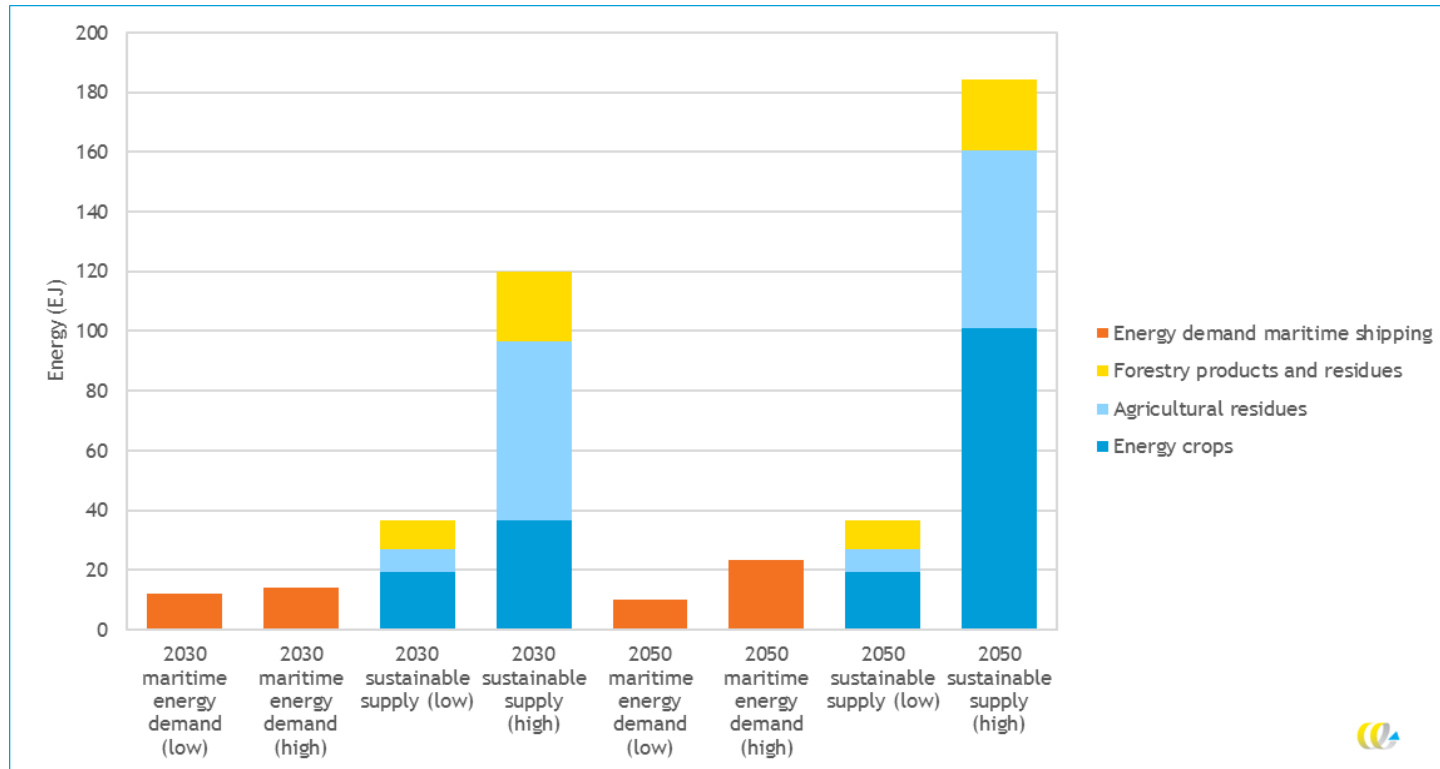


Efficiency improvement and methane slip development on medium speed 4-stroke Otto combustion low-pressure gas engines and some of the enabling technologies. (Source: SGMF, Wärtsilä, MAN ES, Caterpillar & WIN GD)



# LNG offers a decarbonization pathway via liquefied biomethane & synthetic methane

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



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

- Liquefied biomethane (LBM) is scalable
- LBM is globally available
- Availability of liquefied synthetic methane (LSM) will depend on build-out of renewable electricity capacity
- LBM and LSM are likely to be commercially competitive
- LBM and LSM can be used now

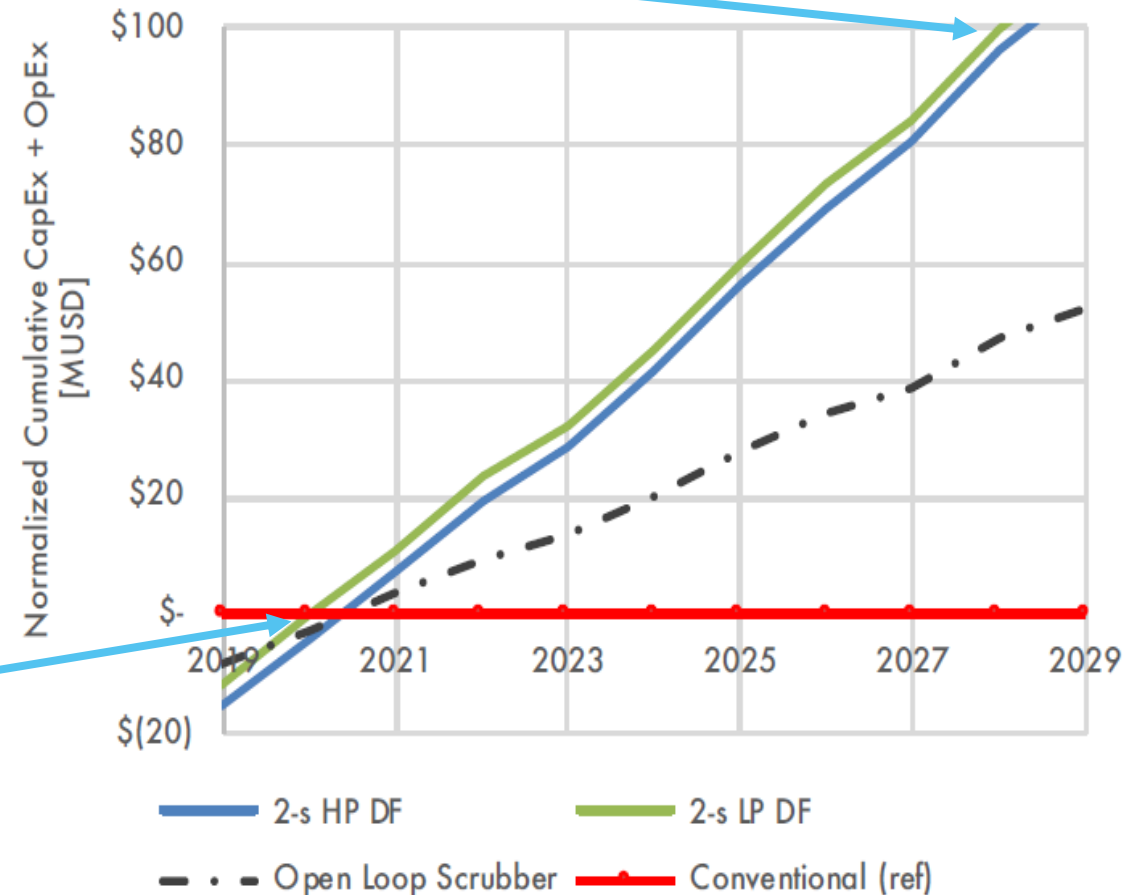
# LNG is already competitive as a marine fuel

## Compelling Investment Case: most financially effective long-term

Best ROI on NPV basis over conservative 10 year time horizon

- Diminishing CAPEX hurdle
- Competitive energy costs
- Cost of LNG is stable
- Modelled investment case for 14K TEU newbuild container vessel

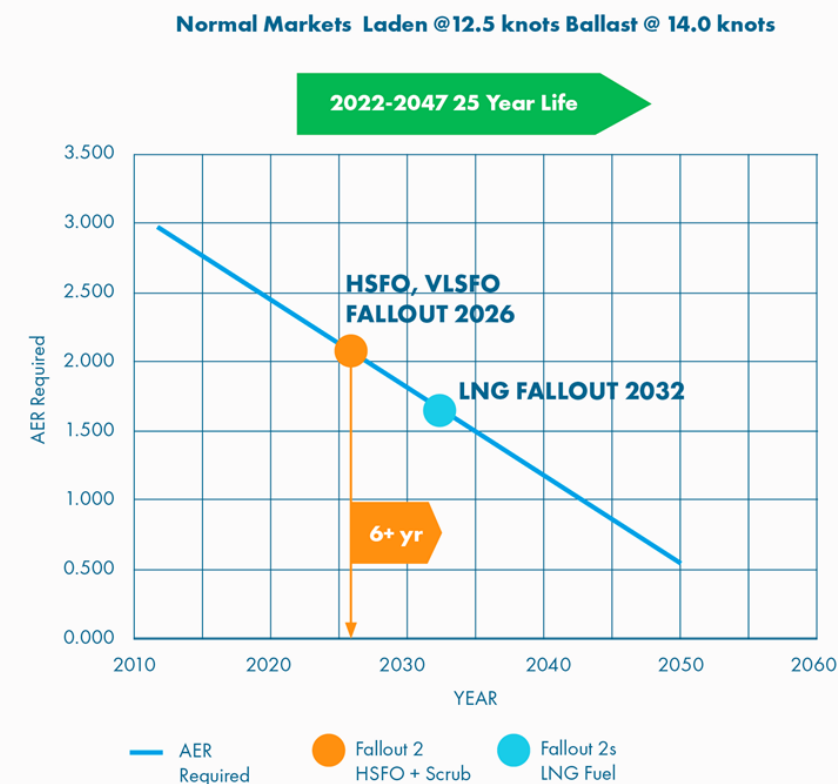
Fast pay-back period – under 2 years





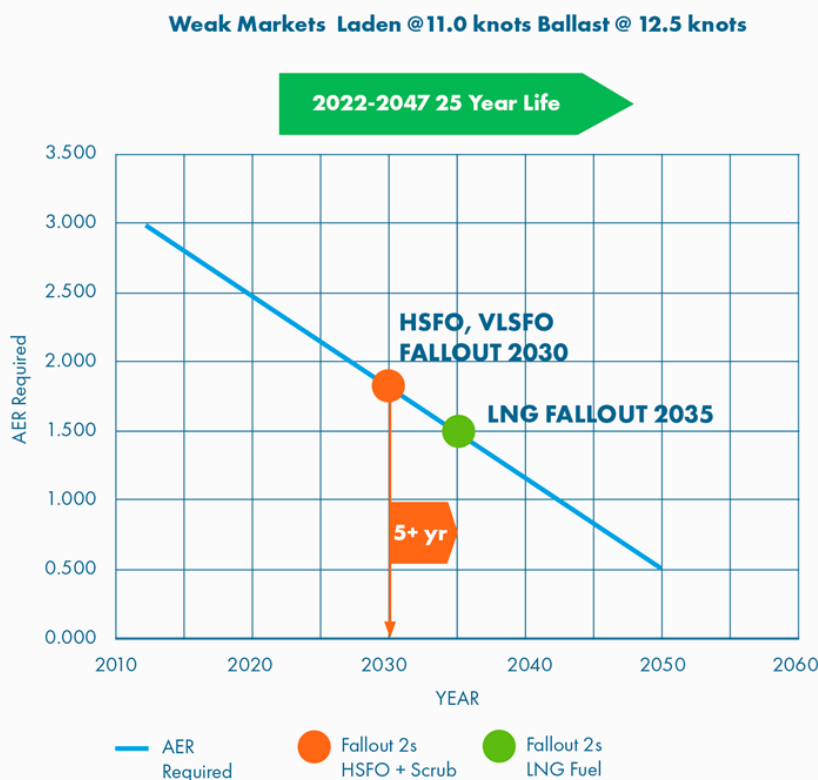
# LNG can offer competitive finance advantage

## Average of +7 years compliance with Poseidon Principle loan requirements



### Normal Markets:

(Ship enters service 2022)  
HSFO, VLSFO faces early fallout challenges at age 4 during 2026 while LNG ship enjoys additional 6+ years GHG compliance



### Weak Markets:

(Ship enters service 2022)  
HSFO, VLSFO faces early fallout challenges at age 8 during 2030 while LNG ship enjoys additional 5+ years GHG compliance.

# The Value of LNG as a Marine Fuel

- LNG is a clear winner on Air Quality essentially eliminating SOx and dramatically (90%+) reducing NOx and PM thereby improving human health
- LNG offers a Decarbonization pathway with EEDI to 2030 and through Bio and Synthetic Methane to 2050
- Proven Safety record over 50 years operationally
- LNG is Available Now and Scalable
  - Global Supply far exceeds marine fuel demand
  - Existing global bulk infrastructure well aligned with major shipping routes
  - “Last Mile” bunkering infrastructure building out fast in most major bunkering ports
  - Bunker vessels - Over 30 expected in operation in the next two years
- LNG is the only alternative fuel that can enable the shipping industry to remain competitive while phasing-out emissions this century.



# LNG: a cleaner future

- ✓ LNG continues to be the only viable option that is safe, available, competitive, improves air quality while reducing carbon
- ✓ The pathway to the future using BioLNG and eventually synthetic products is clear
- ✓ Alternatives are decades away and “waiting is not an option.”

