



# Maritime Decarbonization – Fuels and Metrics

VMCC

February 2022 | Dr Lee Kindberg – Head of Environment and Decarbonization

# Maersk



## Key figures

Number of employees:	85,000
Number of countries:	130
Number of containers shipped:	13 million annually
Number of vessels in fleet:	730+
CEO:	Søren Skou



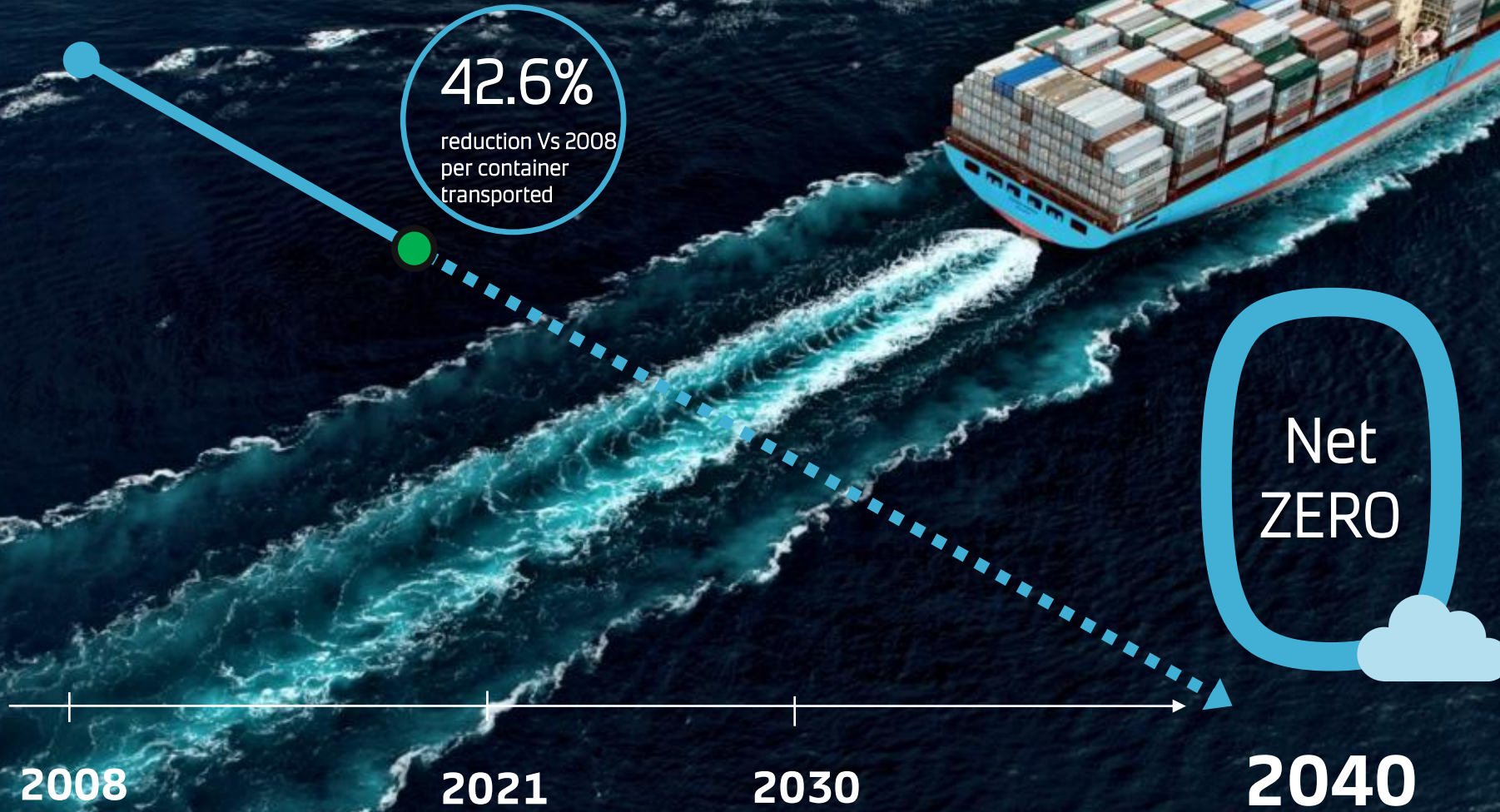
# The climate challenge in shipping is huge

- While it is the most energy efficient way to move goods, shipping emits **3%** of global CO2 emissions. (Around 3.5 Gigatons (Gt) of CO2 emissions yearly)
- Maersk's 700+ container ships emit **0.1%** of Total global CO2 emissions.
- One very large container ship consumes **7,000** ton of fuel oil on a trip from Europe to Asia and back.

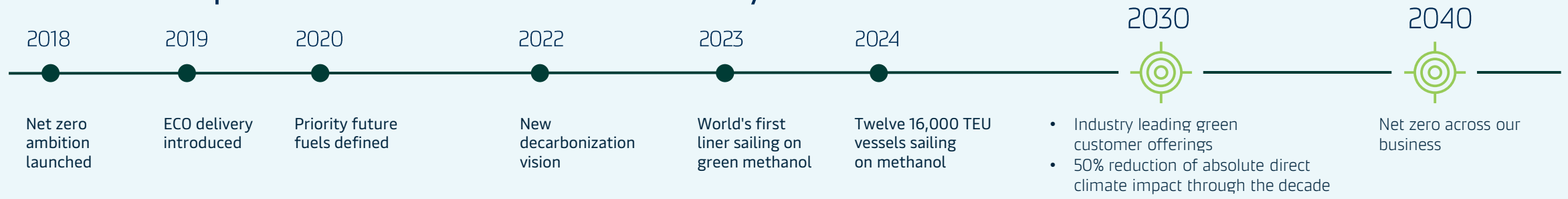


In 2018, we committed to Net Zero Carbon shipping by 2050

This year we accelerated that by 10 years, to 2040



# Roadmap to deliver net zero by 2040



## OUR DECARBONISATION COMMITMENTS



### 2030: Industry-leading green customer offerings

- Ocean: 25% of cargo transported with green fuels
- Air: min. 30% of cargo transported with green fuels
- Contract logistics and cold chain: Min. 90% green operations (scope 1 and 2)
- Inland transportation: Industry leading green offering (targets to be set in 2022)



### 2030: 50% reduction of absolute direct climate impact\*

- Ocean ~50% reduction in emissions intensity
  - Terminals ~70% absolute reduction (scope 1 & 2)
  - Aligned with Science Based Target net zero criteria
  - Natural Climate Solutions above and beyond the SBTi
- \* 2020 baseline



### 2040: Net zero across our business

- 100% Green solutions to our customers
- Net Zero greenhouse gas emission across the whole business/all scopes
- Aligned with Science Based Target net zero criteria

Our **customer commitment** to decarbonise their supply chains in time

... a **societal commitment** to act and have impact in this decade



# Potential fuels identified #1

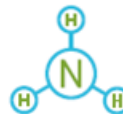
- none are available at scale today



**Green diesel**  
(incl. advanced biofuels)



**Green methanol**  
(bio-methanol and e-methanol)



**Green ammonia**  
(e-ammonia)

Technical and  
operational  
readiness

# Potential fuels identified #2

## - their pros and cons



### Biodiesel

(incl. advanced biofuels)

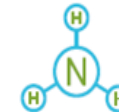
- ✓ Biodiesel market already exists
- ✓ Can be used as drop-in fuel in existing vessels and engines
- ✗ Limited availability of sustainable biomass feedstock
- ✗ Price pressure due to competing demand



### Green methanol

(bio-methanol and e-methanol)

- ✓ Can be produced from both biomass and renewable electricity
- ✓ Already in operation today
- ✓ Well-known handling
- ✗ Bio-methanol: biomass availability of biomass feedstock
- ✗ E-methanol: Availability of biogenic CO2 source

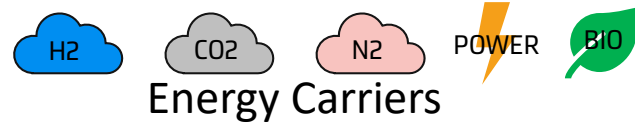


### Green ammonia

(e-ammonia)

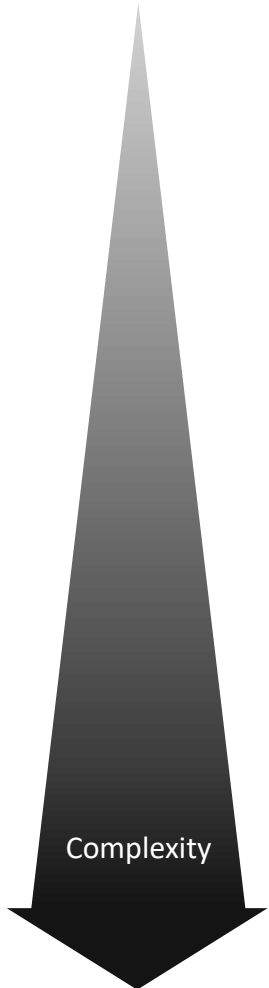
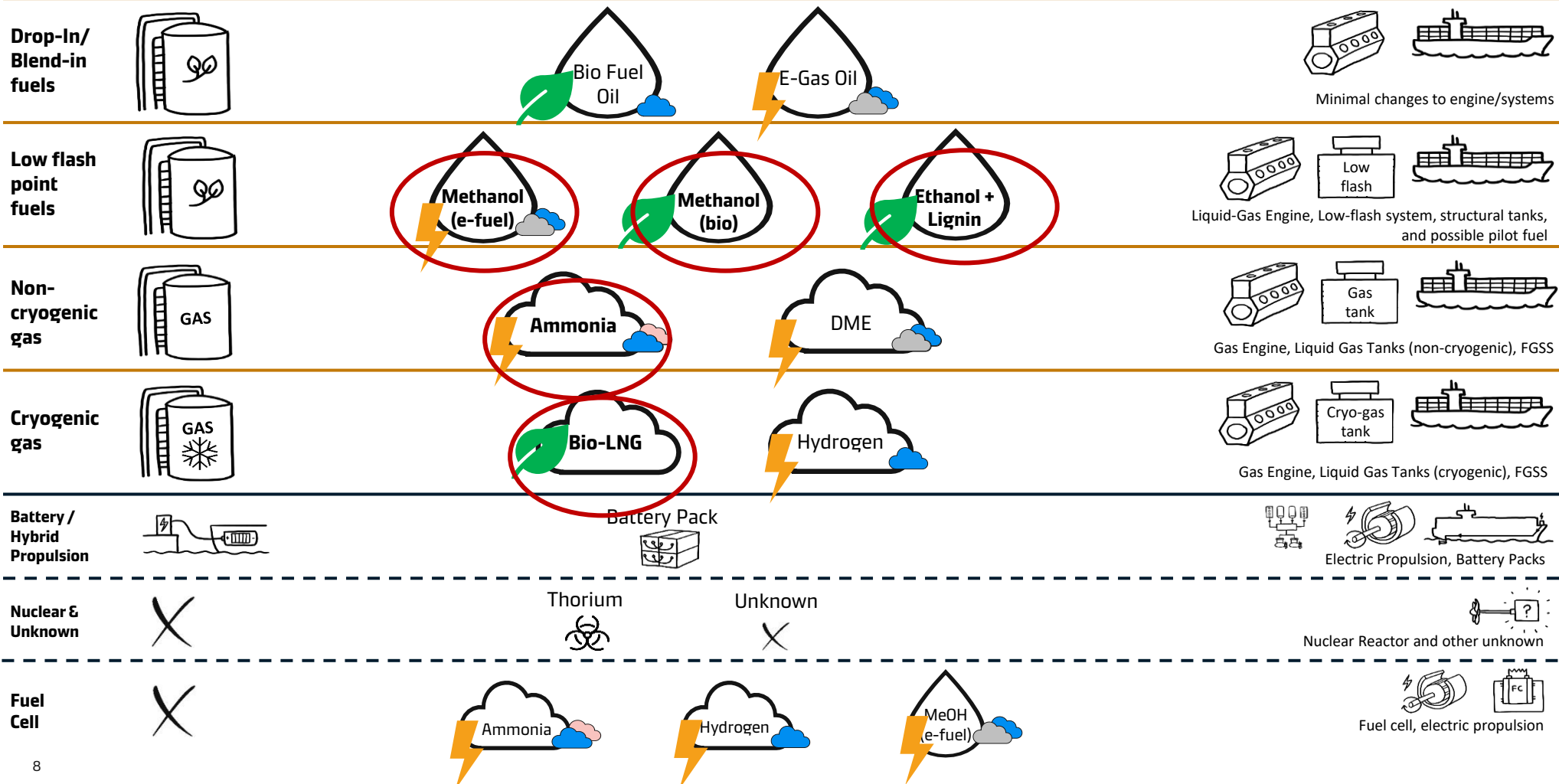
- ✓ Can be produced at scale from renewable electricity alone
- ✓ Fully zero emissions fuel
- ✗ Safety and toxicity challenges
- ✗ Infrastructure challenges at ports
- ✗ Future costs depends on cost of renewable electricity

# Potential carbon-neutral fuels



Energy Carrier Characteristics

Vessel Characteristics



Main focus continue to be: "liquified energy" (whether fuel cells or combustion engines)

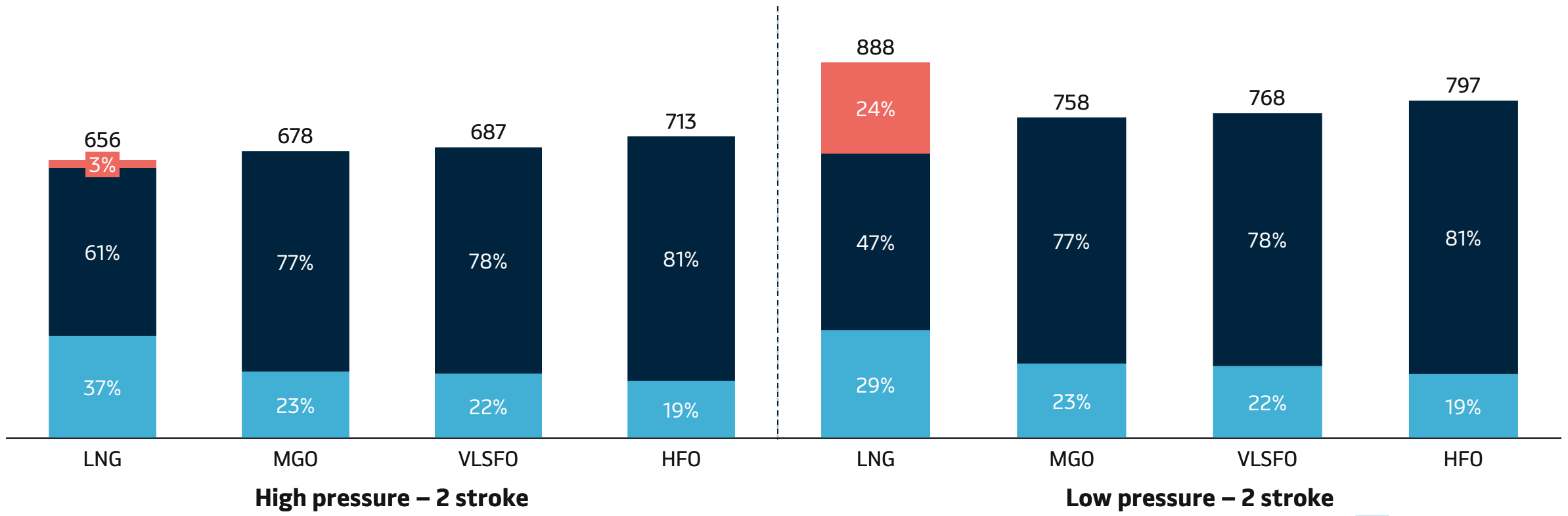


# Our pathway will not include LNG due to the full lifecycle impact

Comparison of GWP20 across different types of fuel

WtW emissions GWP20 (gCO<sub>2</sub>e/MJ)

Methane slip    Combustion    Production



Source: International Council for Clean Transportation: The Climate Implications of using LNG as Marine Fuel, January 2020



# New fuels are not enough - we need to build a new ecosystem



1. Price

2. Scalability

3. Sustainability

4. Tech. viability

So we decided to act  
- to remove barriers and trigger investments

1

Our first "pilot scale" carbon neutral container ship in 2023

- 10,000 ton/year of green methanol secured

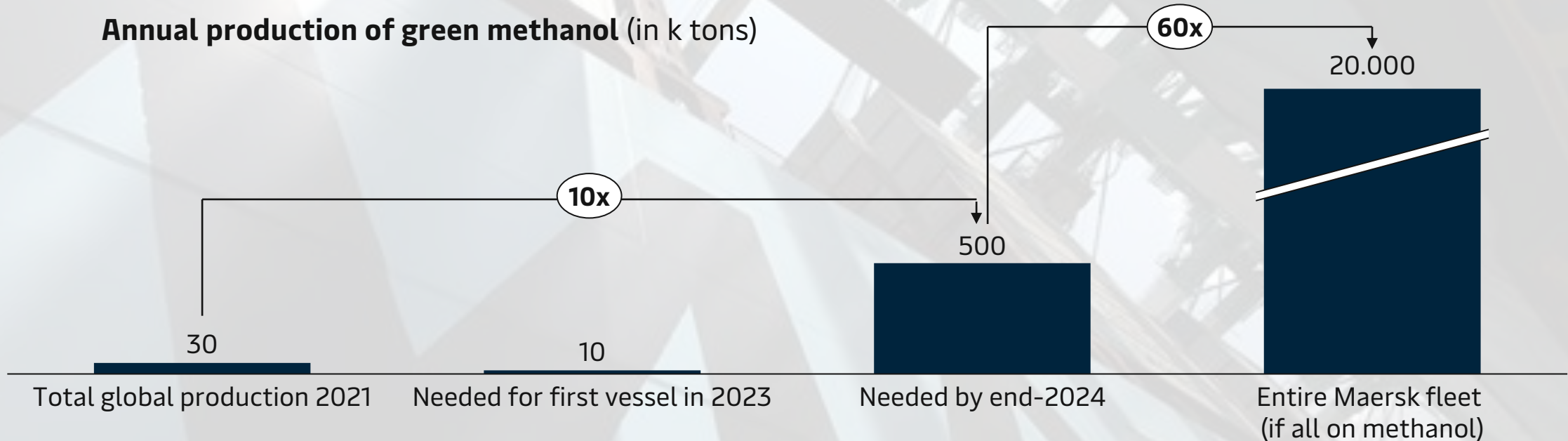
2

Our first series of 12 large carbon neutral container ships in 2024

- We are now looking to source approx 500,000 ton/year of green methanol ...

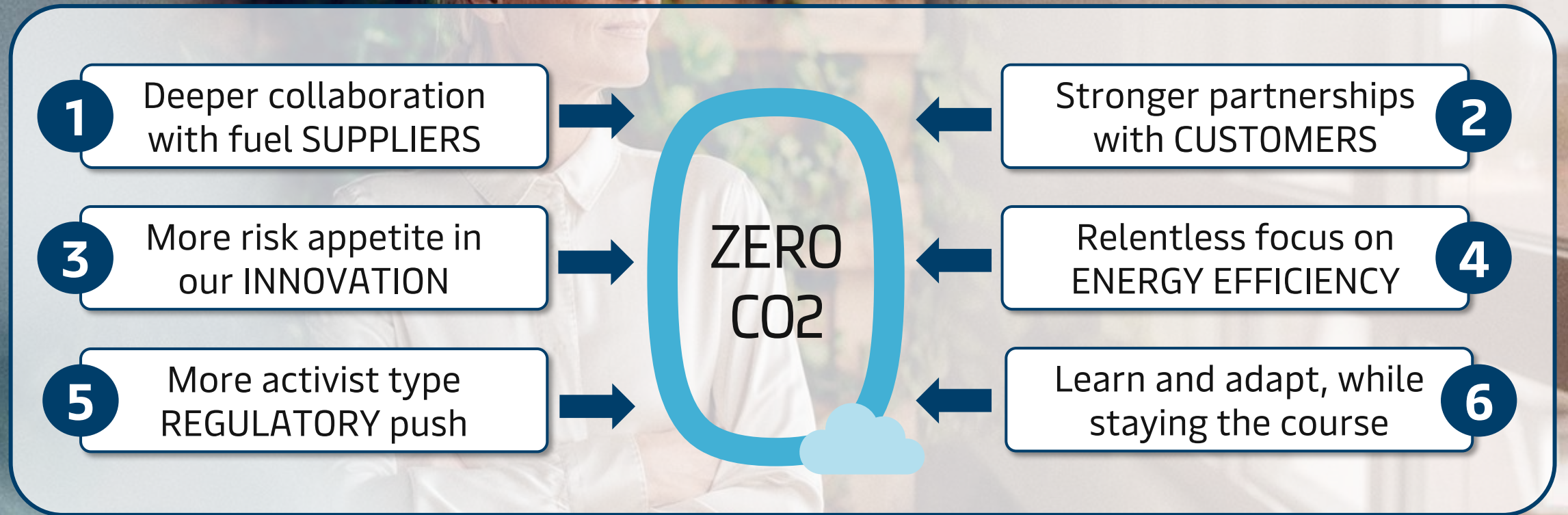
# It will be quite a leap to get to scale – but it can be done

## Annual production of green methanol (in k tons)

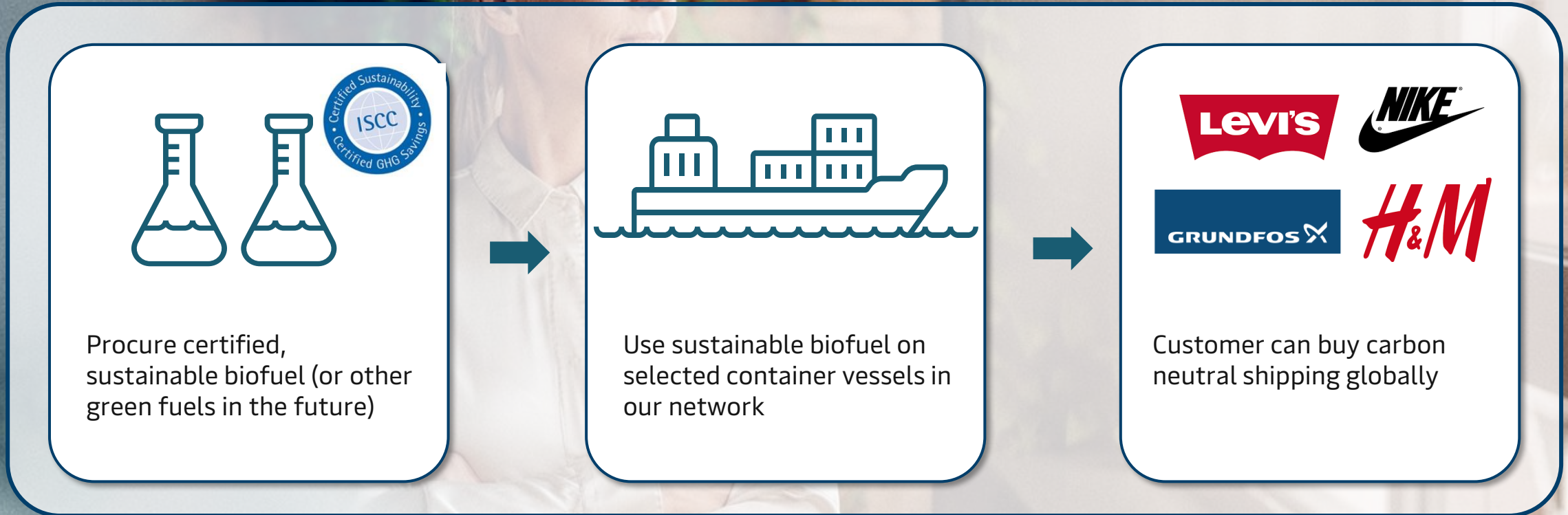


# To be successful...

- we need to change the way we work...



# Customer demand for green shipping is increasing - even at a price premium



# Maersk Press Releases

## A.P. Moller - Maersk accelerates Net Zero emission targets to 2040 and sets milestone 2030 targets

12 January 2022

Decarbonisation Sustainability Share



Ambitious targets set for the entire A.P. Moller - Maersk business to achieve net zero greenhouse gas emissions in 2040 - one decade ahead of its initial 2050 ambition. Associated 2030 targets will Maersk joins first mover coalition to drive demand for carbon neutral solutions in hard to abate industries

04 December 2021

Sustainability Share



Maersk representatives from leading global forums and at the presence of its President Robert and CEO President Louise Bryner, with other industry leaders from the shipping industry, the maritime industry and the world's leading financial institutions.

A.P. Moller - Maersk  
1,119,312 followers  
5d

NEWS! The Port of Los Angeles, Port of Shanghai, and C40 Cities to create world's first transpacific green #shipping corridor between US and China. We are proud to join this mission with leading industry partners to accelerate #decarboni ...see more

### Los Angeles & Shanghai are creating the world's first green shipping corridor between the U.S. & China



## FEBRUARY First green fuel vessel

### A.P. Moller - Maersk to provide end-to-end carbon footprint visibility

03 June 2021

All the way Digital innovation Network update Sustainability Air freight Sea containerisation Share

Green transport Global services Ocean business



### Maersk invests in WasteFuel to develop green bio-methanol production in the Americas and Asia

08 September 2021

Decarbonisation Digital innovation Partnerships/Intelligence Sustainability Share



### A.P. Moller- Maersk, The Ocean Cleanup extend relationship with new three-year partnership

15 January 2021

Sustainability

Share



The Ocean Cleanup is a non-profit organization dedicated to cleaning up the world's oceans of plastic. Maersk will also support the Ocean Cleanup's mission to reduce plastic pollution in the world's oceans and protect our oceans.



### Press releases Maersk invests in electrofuels startup company

23 Sep 2021



### Insights Decarbonizing supply chains with emission-free block train services

13 Jun 2021

### Performance Team - A Maersk Company buys 16 battery-electric trucks for Southern California warehousing and distribution fleet

01 September 2021

North America Warehousing and Distribution Global Services Share



### Maersk secures green e-methanol for the world's first container vessel operating on carbon neutral fuel

10 August 2021

Decarbonisation Global Services Sustainability Share



### Maersk meets increased customer needs with a dedicated, carbon neutral Pharma warehouse in Poland

05 September 2020

Share

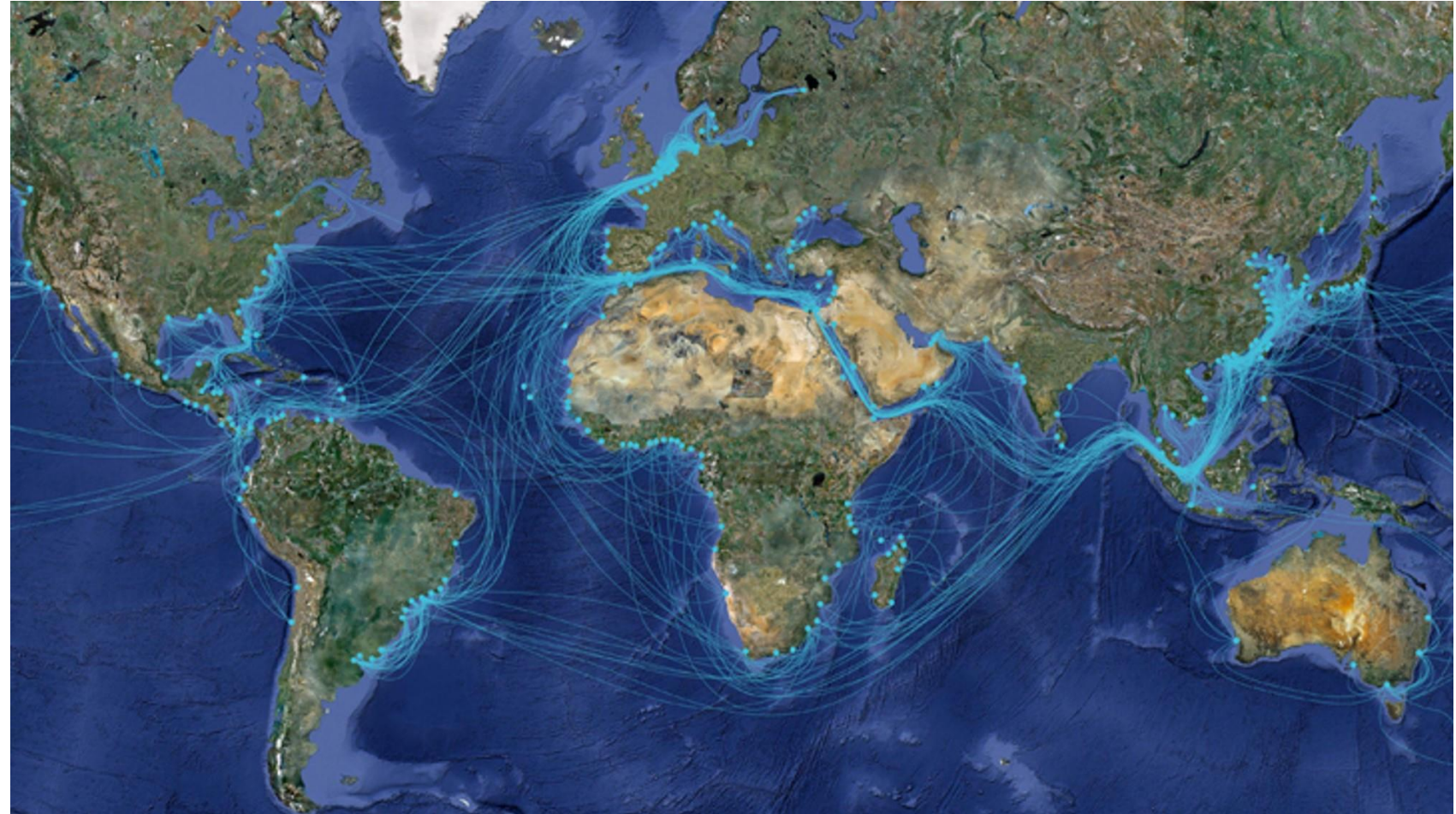


Thank you

Lee Kindberg

Environment & Sustainability  
North America

[lee.kindberg@maersk.com](mailto:lee.kindberg@maersk.com)





# Carbon Neutral Feeder 2023



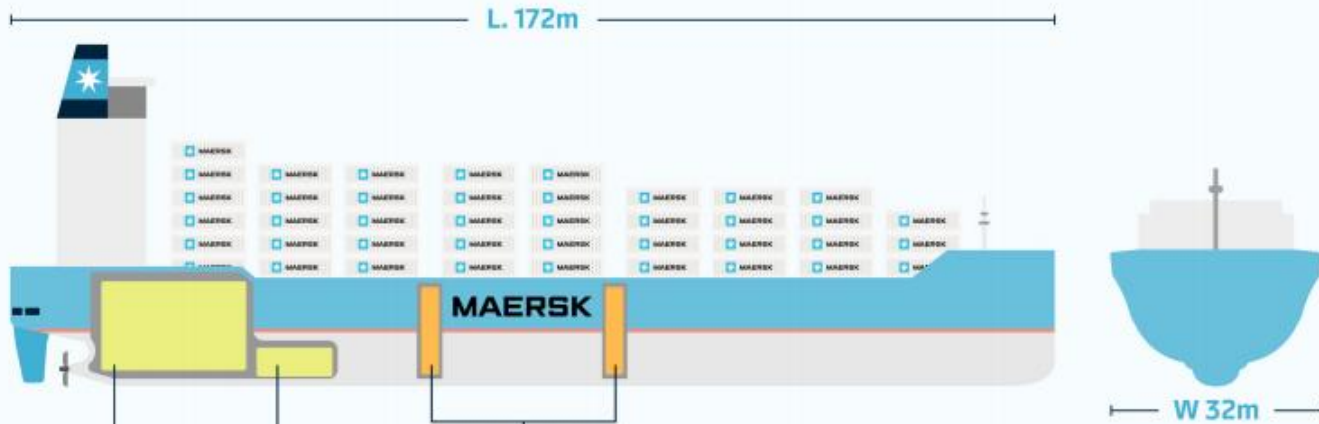
**Fuel type:**  
Carbon neutral  
methanol



**Container Capacity:**  
2100teu\* includes  
400 reefers



**Top speed:**  
18 Kn



**MAN 6G50-LGIM** methanol  
main engine and methanol  
capable gensets

**FUEL SYSTEM**  
Complete fuel flexibility with methanol,  
biofuel and conventional fuels  
*Capable of carbon neutral operation during 2023*

\*Twenty Foot Equivalent Container



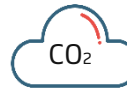
# A.P. Moller - Maersk accelerates fleet decarbonization..



12 x 16000TEU entering fleet 2024



Carbon Neutral Methanol equipped dual fuel engines



Annual CO2 emissions savings of around 1.5 million



The time to act is now, if we are to solve shipping's climate challenge. This order proves that carbon neutral solutions are available today across container vessel segments and that Maersk stands committed to the growing number of our customers who look to decarbonise their supply chains. Further, this is a firm signal to fuel producers that sizable market demand for the green fuels of the future is emerging at speed.

Soren Skou  
CEO, A.P. Moller - Maersk

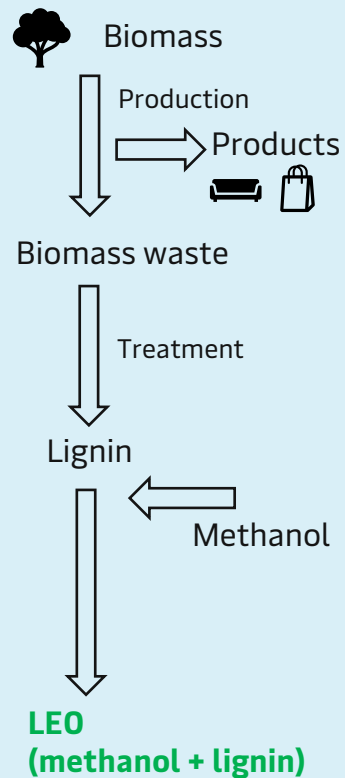


# For our fleet we will leap-frog directly to carbon neutral fuels

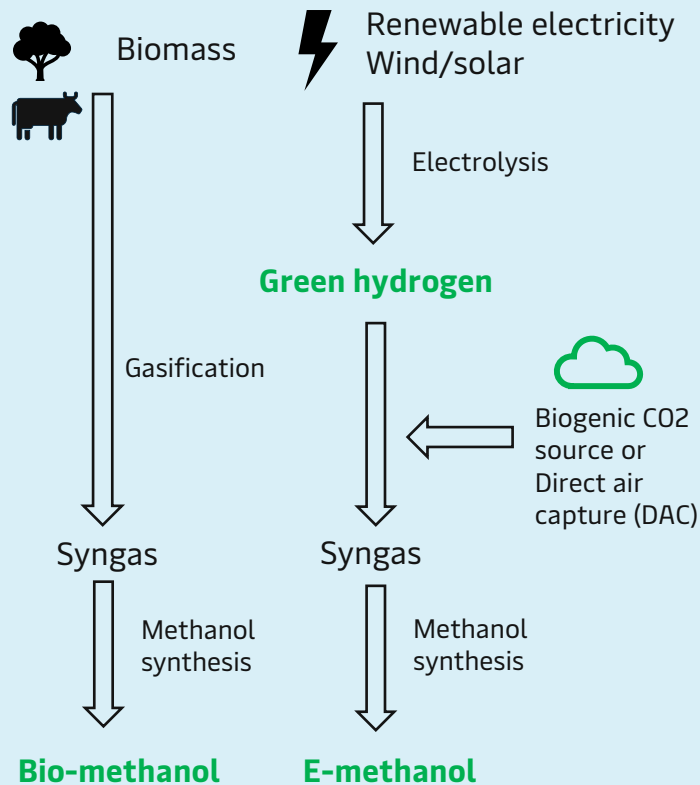
## Actively pursuing four solutions

### Biodiesel as drop-in fuel

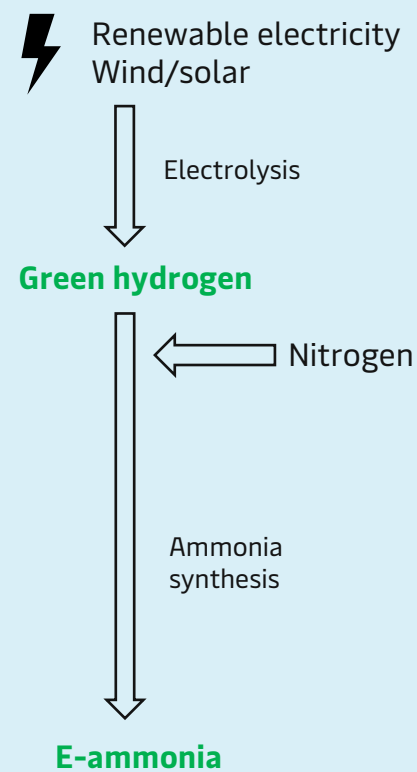
#### LEO (net zero)



#### Green methanol (net zero)



#### Green ammonia (zero carbon)



## Monitoring

Fuel cells

Batteries

Hydrogen

Advanced e-fuels

Advanced bio-fuels /  
Biomass-to-Liquid



MAERSK