

# Transition to methanol

## Learnings from Laura Maersk



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Leading the way through our all-in climate strategy

Maersk targets  
**net zero emissions in 2040**  
across the entire business



# Roadmap towards net zero in 2040



## OUR DECARBONISATION COMMITMENTS



**2030: Industry-leading green customer offerings across the supply chain**



**2030: Aligned with a Science Based Targets initiative 1.5°C pathway**



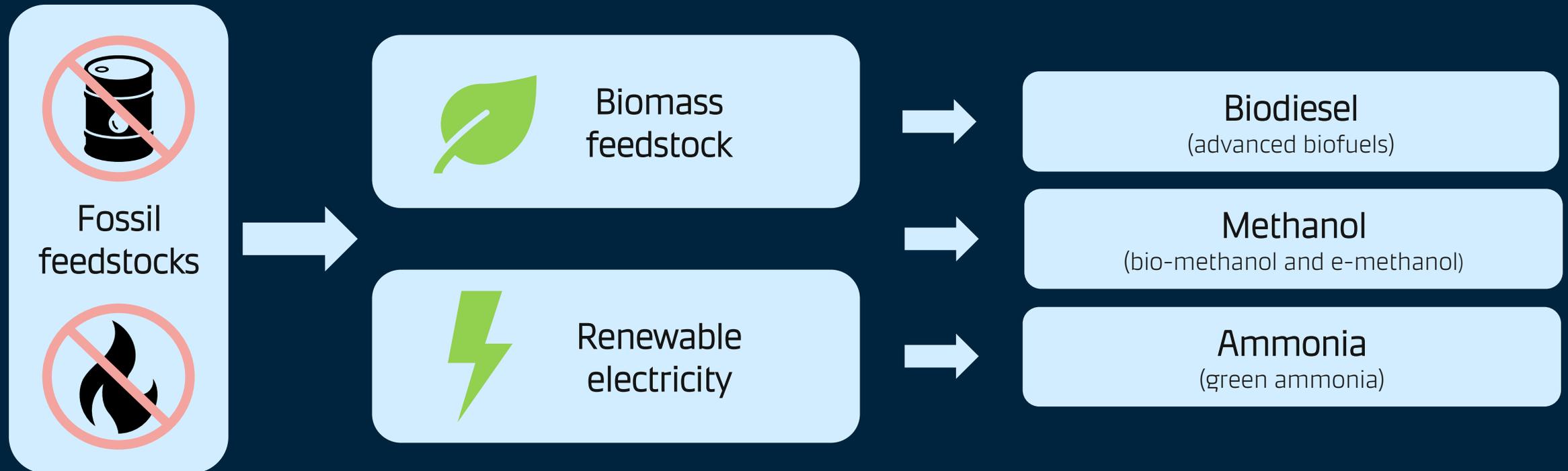
**2040: Net zero emissions across the business and 100% green solutions to customers**

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

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



# Transitioning our fleet from fossil fuels to green fuels



# To address the climate crisis, for our fleet, we must leap-frog directly to green fuels – no time for transition fuels

## Solutions that we **KNOW** can solve the climate problem

### Biodiesel

 Biodiesel (advanced biofuels)

- ✓ Can be used as drop-in fuel in existing vessels, supply chain and infrastructure
- ✓ Needed as pilot fuel
- ✓ Promising innovation within advanced biofuels
- ❖ Limited availability & scalability
- ❖ Price pressure from competing industries

## Solutions that we **KNOW** can solve the climate problem

### Green methanol

 Bio-methanol  E-methanol

- ✓ Vessel tech available
- ✓ Operational experience at sea
- ✓ Easy to handle and supply chain can be managed
- ✓ Retrofit existing fleet affordably
- ✓ Best solution for the full marine ecosystem
- ✓ Bio-methanol cheapest short-medium term
- ❖ Limited biogenic CO2 availability

## Solutions that we **THINK/HOPE** can solve the climate problem

### Green ammonia

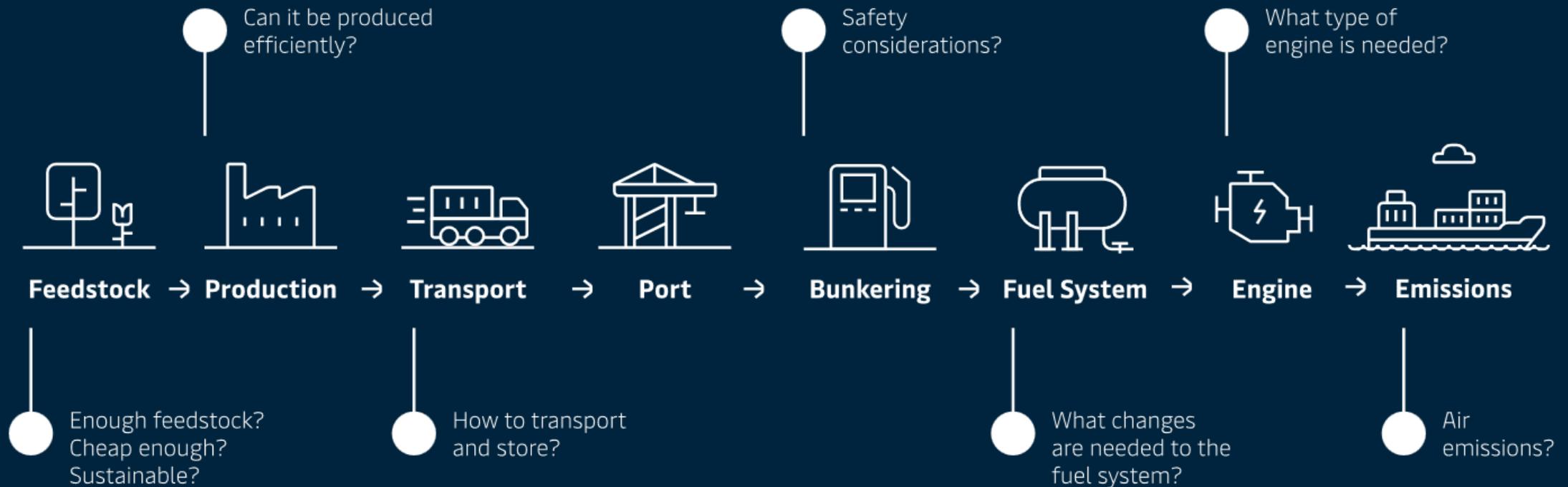
 E-ammonia

- ✓ Cheapest long-term option
- ✓ 'Perfect e-fuel' with scale potential
- ✓ Zero-carbon
- ✓ Vessel tech ready in ~3 years
- ❖ Large engines by decade's end
- ❖ No operational experience at sea
- ❖ Difficult to handle/bunker
- ❖ Toxic – safety challenges
- ❖ Environmental impact of ammonia & N2O emissions unclear



Green methanol & biodiesel are the only certain, scalable fuels for significant impact this decade

# For each of the fuels, transformation needs to happen across the entire fuel supply chain



# We are breaking the chicken-and-egg problem by accelerating our fleet decarbonisation

1

Our first "pilot scale" carbon neutral container ship is here

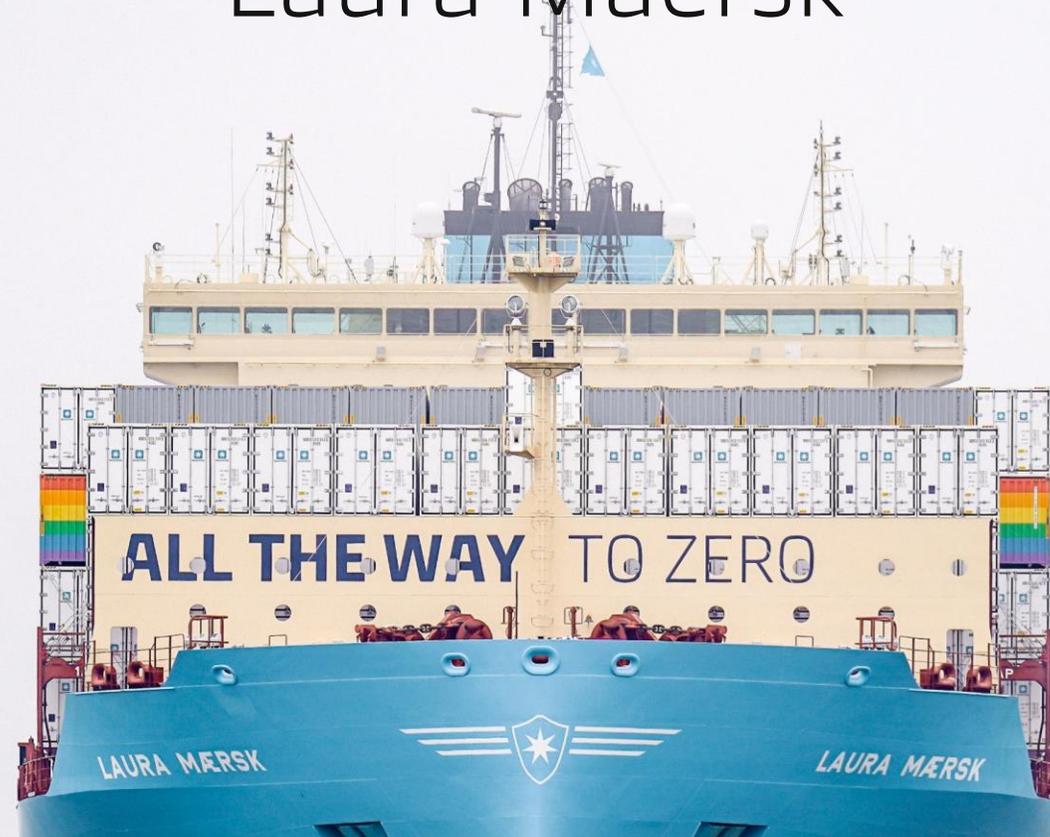
10,000 ton/year of green methanol secured

2

Our first series of 12 large carbon neutral container ships in 2024 and 2025 and 6 large container ships in 2025

We have announced eight green methanol offtake partnerships and will continue to develop partnerships

# Laura Maersk



- The start of a new generation of green methanol vessels
- 2,100 TEU feeder vessel with dual engine was delivered in July 2023
- During her maiden voyage she bunkered via STS bunkering in Singapore
- Deployed on the Baltic shipping route between Northern Europe and the Gulf of Bothnia

# The Next Generation Vessels

- The new large container vessels represents a completely new vessel design
- Accommodation is moved forward, and engine exhaust routed aft
- 16.000 m<sup>3</sup> methanol tanks enabling full round trip operation
- They will be 20% more energy efficient than industry standard

# Bunkering challenges and responses



## Challenges

- Low flash point: 11°C (vs. 60°C for conventional fuels)
- Effort in controlling the vapour
  - Vapour return line to send vapour back to the Barge
- Inhalation of vapour is not toxic
  - Need excessive amounts to see effects
  - Ingestion, eye contact and skin contact is where the danger is
  - 2 teaspoons ingested can cause severe health impacts



## Safety Measures

- CCTV and methanol detection systems
- Zones
  - *Hazardous Zone* - 10m. PPE and dry powder extinguishers provided.
  - *Safety Zone* - 20m. Light fixtures grounded and no cargo ops. Any spark avoided.
  - *Security Zone* – 100m
- Emergency Shut Down (ESD) system
- Fire burns blue at night, invisible during the day
- QCDC coupling on both liquid and vapour lines



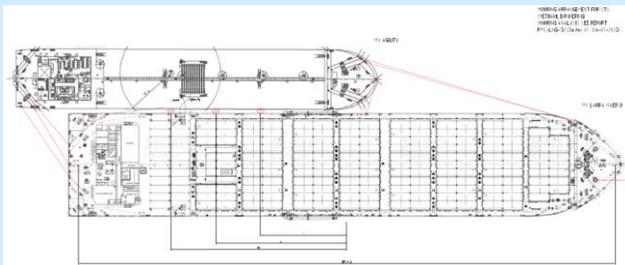
## Spill & Stowage

- Spill procedures are different
  - Cannot be recovered from the ocean
  - Biodegradable and will evaporate slowly over time.
- Onboard spill procedures may vary but typically require containment and dilution with water
- More planning required from a stowage perspective to avoid stowing cargo close to Safety Zone

# Preparation was key to developing safe operational procedures

## Mooring Compatibility Study

- MT Agility STS dynamic optimoor mooring analysis with Laura Maersk at Raffles Anchorage – Bow to Bow
- Hose length calculation



## Defining Operational Procedures

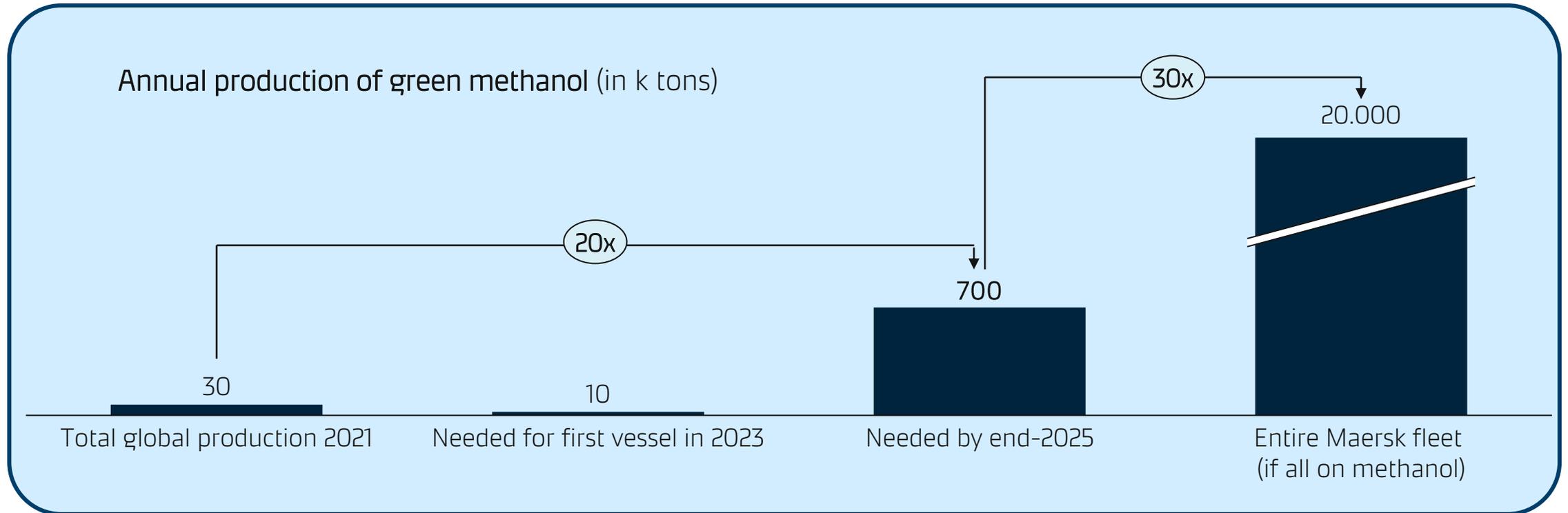
- Overarching principle is for Methanol procedures to be additional to existing.
- Based on HAZID and HAZOP studies for two Classes of vessels (2.000 and 16.200 TEU) and Gas Dispersion Study.
- Methanol fuel regulations require
  - Dry type quick connect/disconnect couplings (QCDC)
  - Breakaway coupling
  - Emergency Shut Down (ESD) link
  - Remote operation during bunkering
  - Drain/purge of bunker lines not in

use

## Crew Training

- Training of vessel crews is governed by International Conventions (STCW).
- Methanol is treated similarly to other marine fuels.
- Specific training for Engineer Officers on operational aspects, including leaks and fires.
- Generic training on fire-fighting provided.
- An internal working group is formed which has identified standard training requirements.

# Short term it will be a challenge to source the fuel but it can be done



Thank you.

