

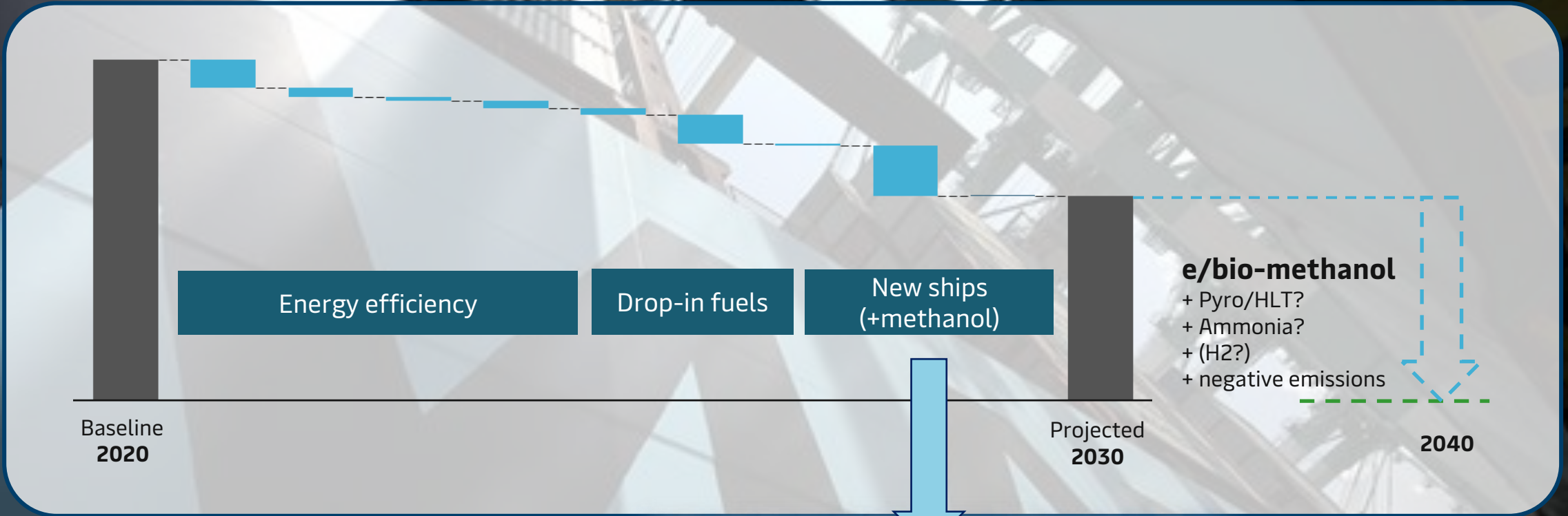
# Decarbonising Maersk

*Need for new fuels to reduce emissions from our fleet*



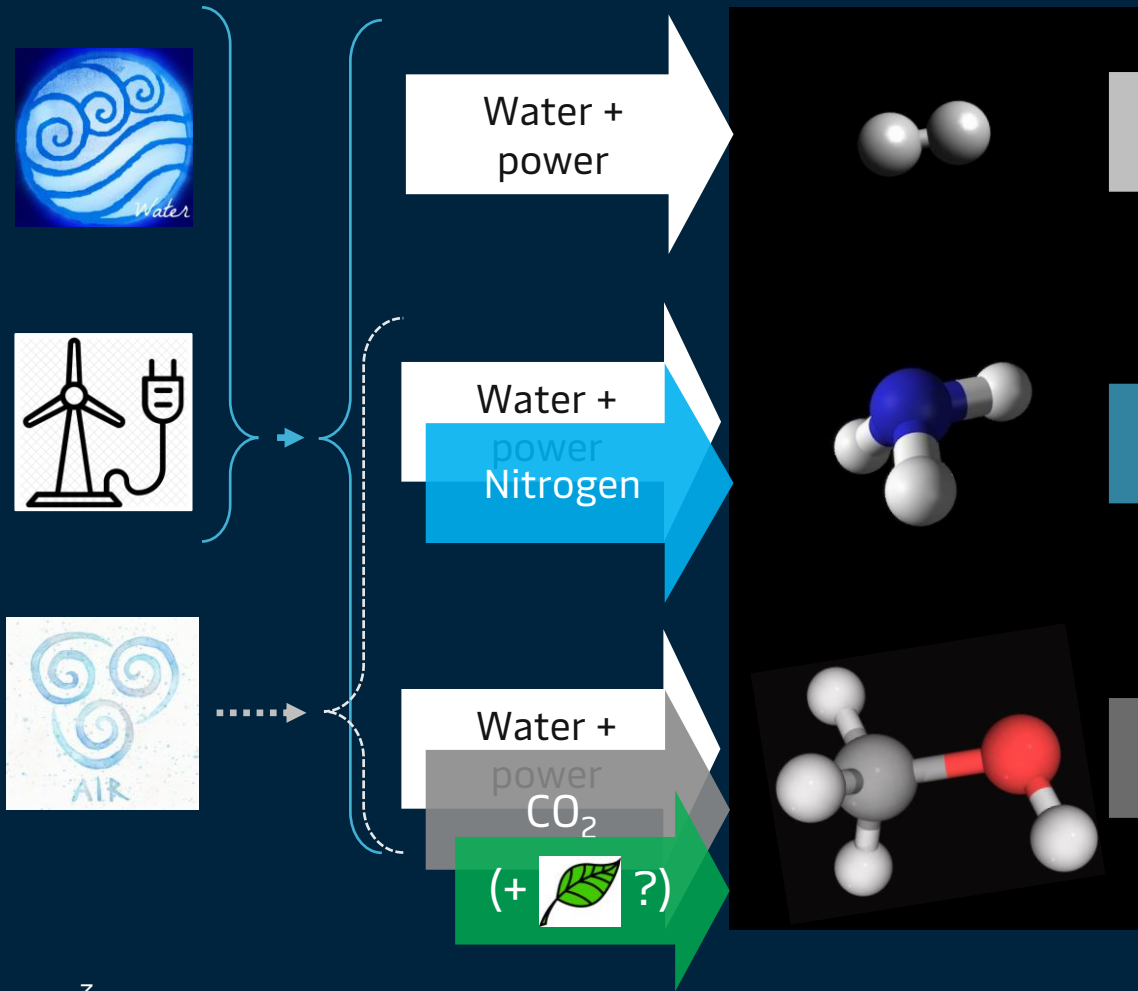
*Jacob Hjerrild Zeuthen  
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# How do we intend to reach our reduction targets – longterm



25 dual fuel methanol ships ordered to date

# Hydrogen-derived Future Fuels



Hydrogen as fuel?

Perfect fuel for fuel cells  
 No carbon dependency  
 No emissions (!?)  
 Difficult handling and safety  
 Onboard storage (!)

Ammonia as fuel?

Poor fuel quality  
 Great scalability – no carbon  
 Unknown emissions  
 Safety (!)  
 Regulation (!)

Methanol as fuel?

OK fuel quality  
 Carbon dependency (!)  
 Low emissions (CO<sub>2</sub> must be balanced)  
 Handling is known  
 Proven onboard technology

Only real option today

To back a future fuel we need 'acceptable feasibility' within these areas....

Sustainability

Price levels (incl. outlook)

Availability & scalability

Safety

Regulation

Bunkering/infrastructure

Ship CAPEX & OPEX

Properties

# Viability status – METHANOL

Sustainability

Price levels (incl. outlook)

Availability & scalability

Safety

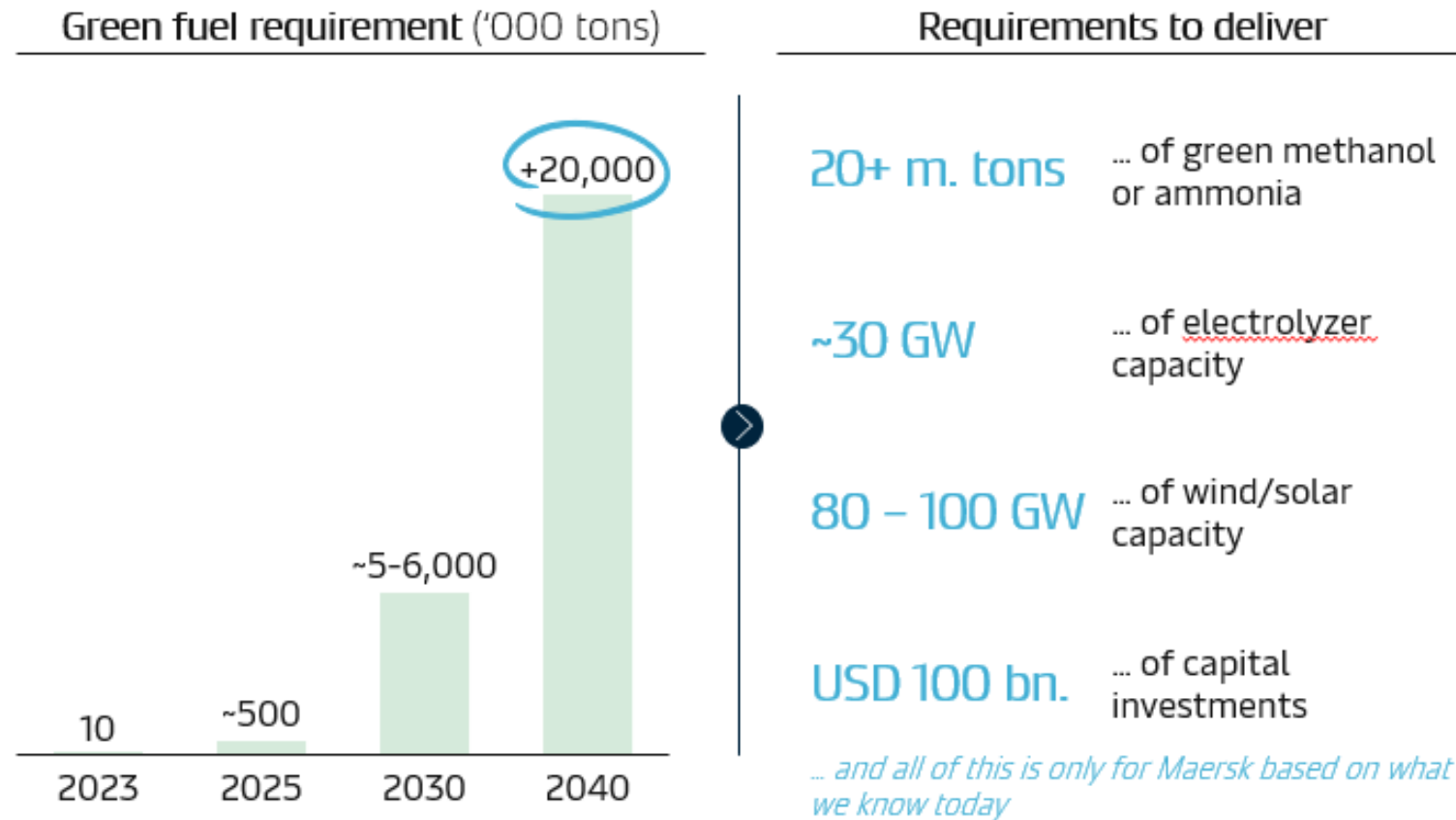
Regulation

Bunkering/infrastructure

Ship CAPEX & OPEX

Properties

To power a fleet of today's size, APMM needs 20+ million tons of green methanol or ammonia; significant green energy requirement



## Viability status – PYRO/HTL

✓  Sustainability

(✓)  Regulation

(✓)  Price levels (incl. outlook)

(✓)  Bunkering/infrastructure

?  Availability & scalability

?  Ship CAPEX & OPEX

✓  Safety

✓  Properties

# Status and challenges – pyro/HTL

## ❑ Pro's:

- ❑ Scalable (feedstock agnostic), cheap, blending in HFO, potential use as pilot fuel for methanol ships, less competition, negative emissions.

## ❑ Cons's:

- ❑ Crude pyro/HTL oils most likely to poor quality, i.e. slight upgrading is needed, not fully mature technology.

## ❑ CHALLENGE:

- ❑ What combi of pyro/HTL process and upgrading gives the cheapest pyro-oil just about good enough to blend into HFO at x%?
- ❑ How can we scale pyro/HTL oils fast enough?





# Challenges – for decarbonizing shipping fast enough

## 1. **Scaling** production of affordable green methanol fast enough (*short term*)

- Scaling ren. el & green H2 production fast enough → subsidies & partnerships with suppliers
- Securing access to affordable biogenic CO2 or DAC → accelerate clarification of e-ammonia as pot. fuel

## 2. **Identifying** (and executing fast enough) a fuel solution for decarbonising the existing fleet

- Pyrolysis/HTL oils looks promising but low TRL → work closer with developers

## 3. Having a continued increase in **customers** being willing to pay premium (*long term*)

- We do see exponential growth in interest from customers, but to get all onboard → work closer with customers

## 4. A **regulatory** level playing field (*short/medium/long term*)

- Introducing a world wide carbon tax fast enough → work closer with regulatory actors

# Methanol ships – first of many delivered



Milestone: Maersk launches methanol-powered feeder in bold move toward carbon neutrality - Offshore Energy (offshore-energy.biz)



[Morten Bo Christiansen: The first-ever cargo ship powered by green fuel | TED Talk](#)



# Worlds largest e-methanol plant

Renewable power;      New 300 MW Solar PV  
Hydrogen;              50 MW PEM electrolyzers  
Biogenic CO<sub>2</sub>;        Trucked from nearby biogas facility  
Product;                32,000 tonnes of e-methanol a year



[European Energy takes first step into large-scale commercial Power-to-X - European Energy](https://www.tvsyd.dk/aabenraa/det-groenneste-liv-er-i-aabenraa-her-ligger-landets-stoerste-solcellepark)

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# New fuel-producing company: C2X


**Bloomberg** US

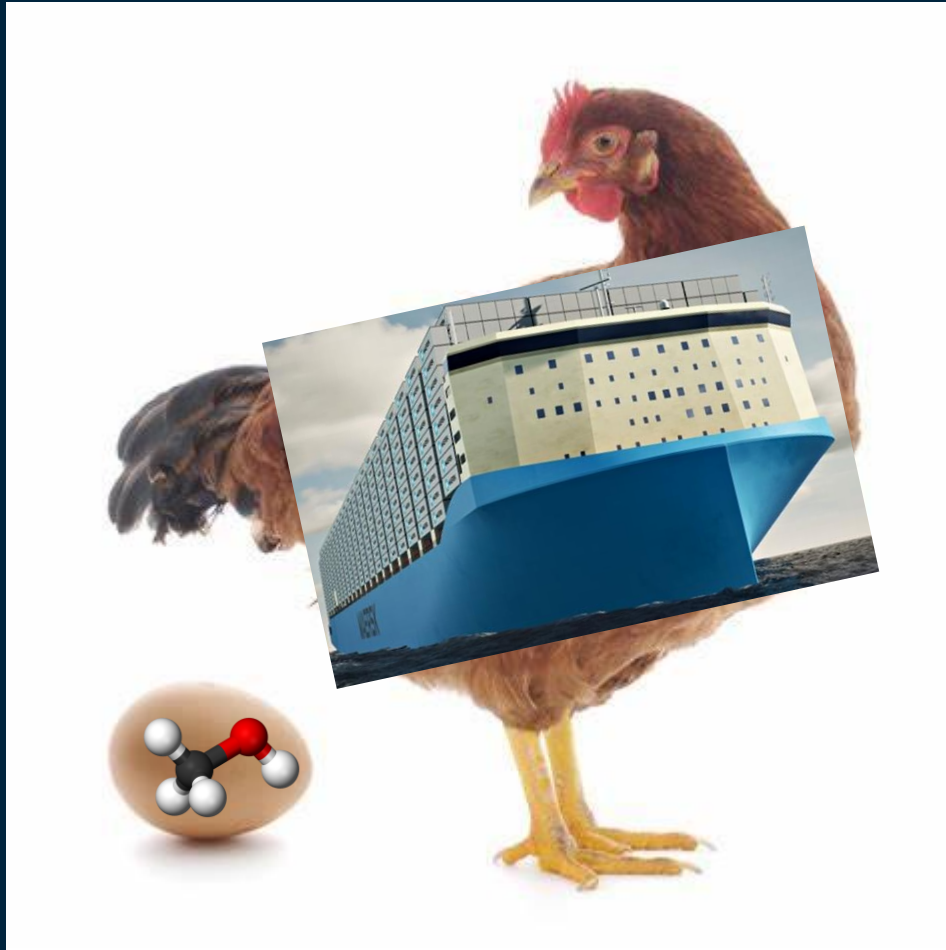
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Green

## Billionaire Maersk Family Forms Green Methanol Firm for Shipping

- C2X to produce 3 million tons of the alternative fuel by 2030
- Maersk alone is responsible for 0.1% of human CO2 emissions





...so far the challenge is not the chicken  
but rather to get enough eggs

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Thanks!

