

# Teknologisk Institut

## Ren luft konference 17.03.2021

Perspektivering af skibsfartens fremtidige  
rolle i reduktion af emissioner

Valdemar Ehlers, Teknisk chef Danske Maritime



# Agenda

1. Skibsfartens emissioner idag
2. SO<sub>x</sub>, NO<sub>x</sub> og partikler
3. Klimadagsordenen
4. Krav og forventninger til ny regulering

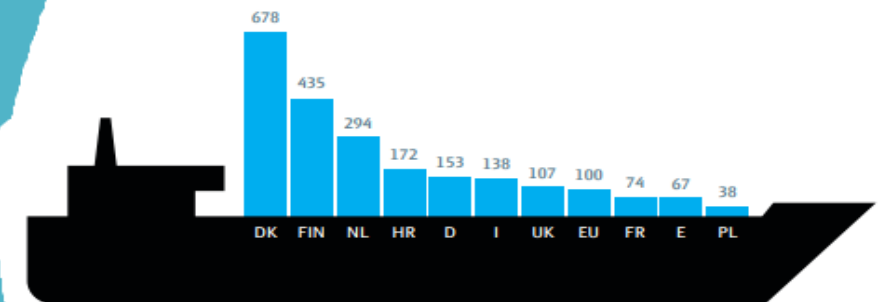


# Denmark is a strong maritime nation

- Denmark is the Worlds 7th largest maritime industry
- Denmark is the Worlds 12th largest ship repair nation
- Denmark is the Worlds 8th largest 8th largest ship scrapping nation
- Denmark is the Worlds 5th largest shipping nation measured in operated tonnage

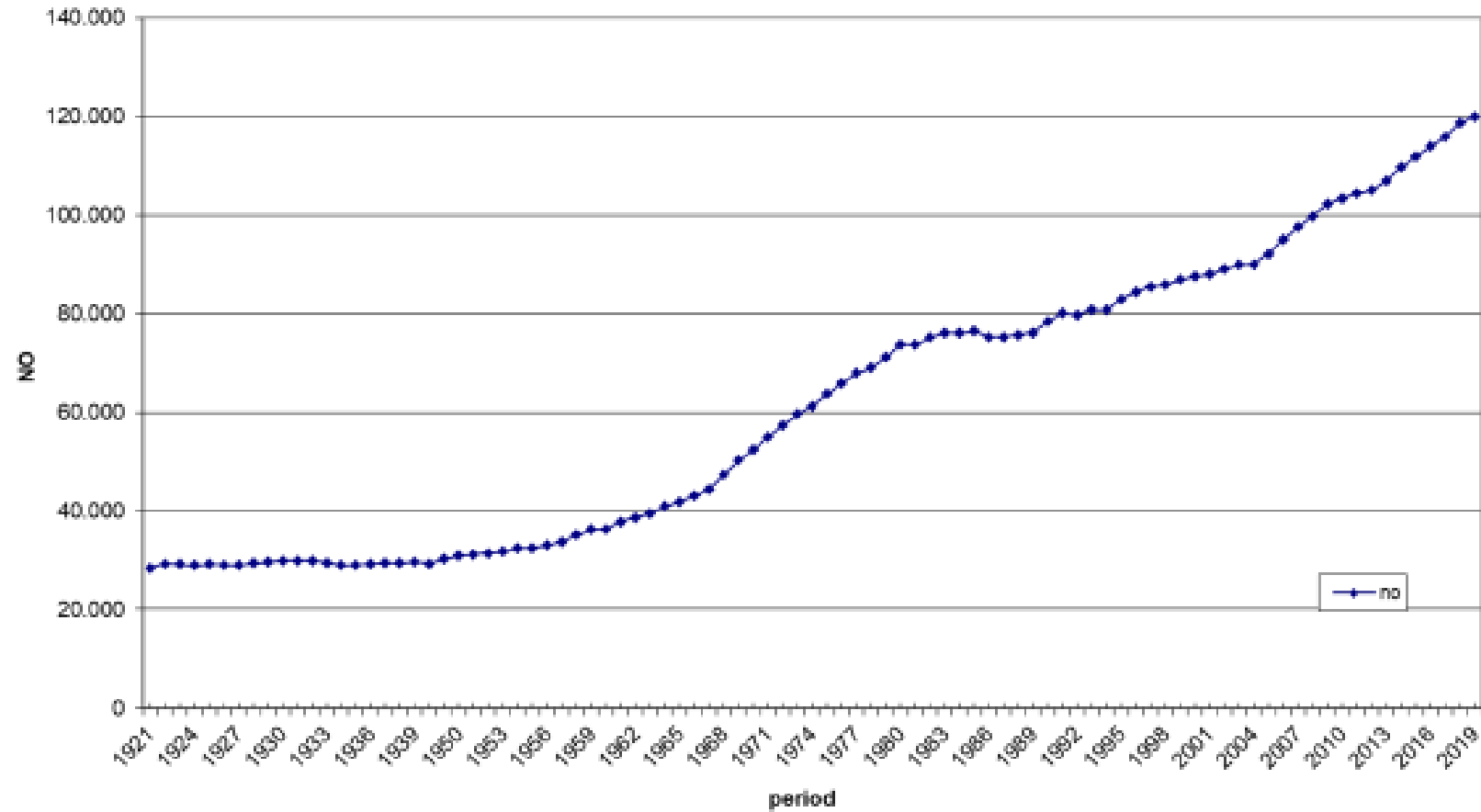
## Maritim industriproduktion pr. indbygger

EU = index 100



Kilde: Danske Maritime

### World fleet since 1921 in numbers



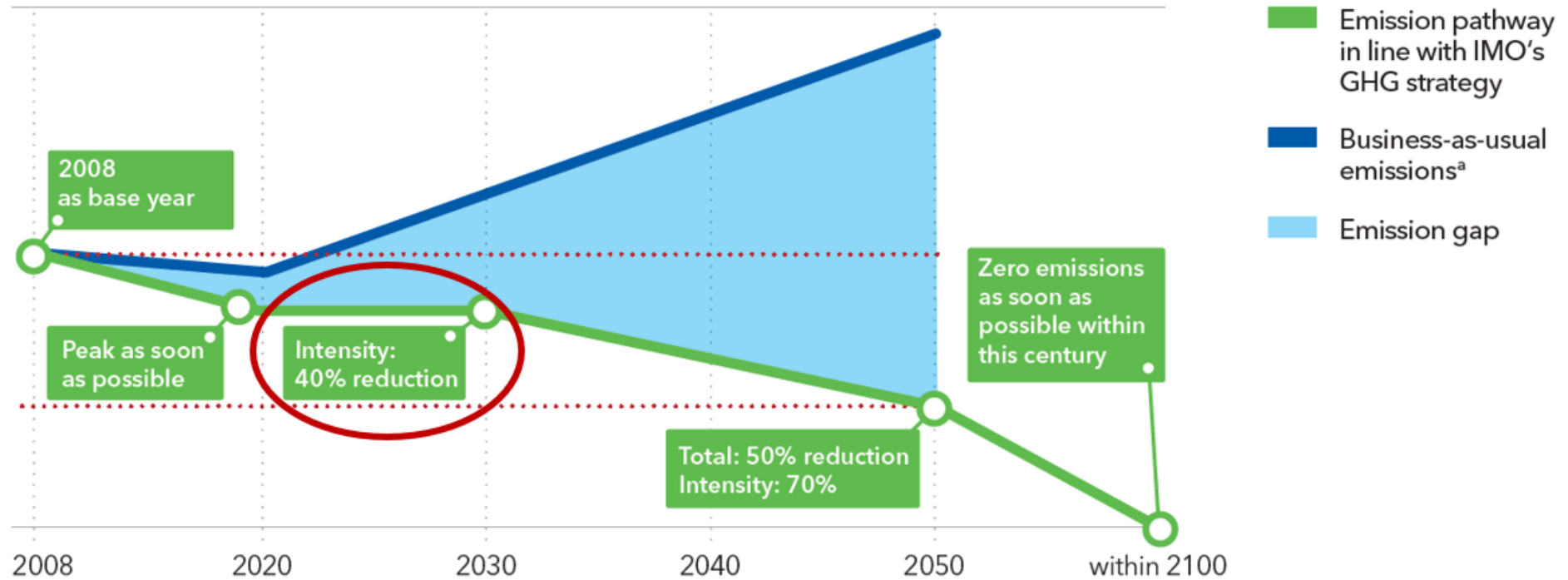
## Verdensflåden



- Forbrænder årligt 250 – 300 mio, ton fossil brændsel
- Står for omkring 3% af de samlede globale CO2 emissioner
- Vi må forvente en fortsat stigning i CO2 emissionerne måske indtil 2050 afhængigt af hvor hurtigt reducerende tiltag indføres
- Vi arbejder under tidspres
- Langsigtet mål om komplet de-karbonisering
- Ændrede brændstoftyper, forsyningskæder, pristrukturer m.v.
- Optimering og engineering

## IMO strategy on GHG reductions – vision and ambitions

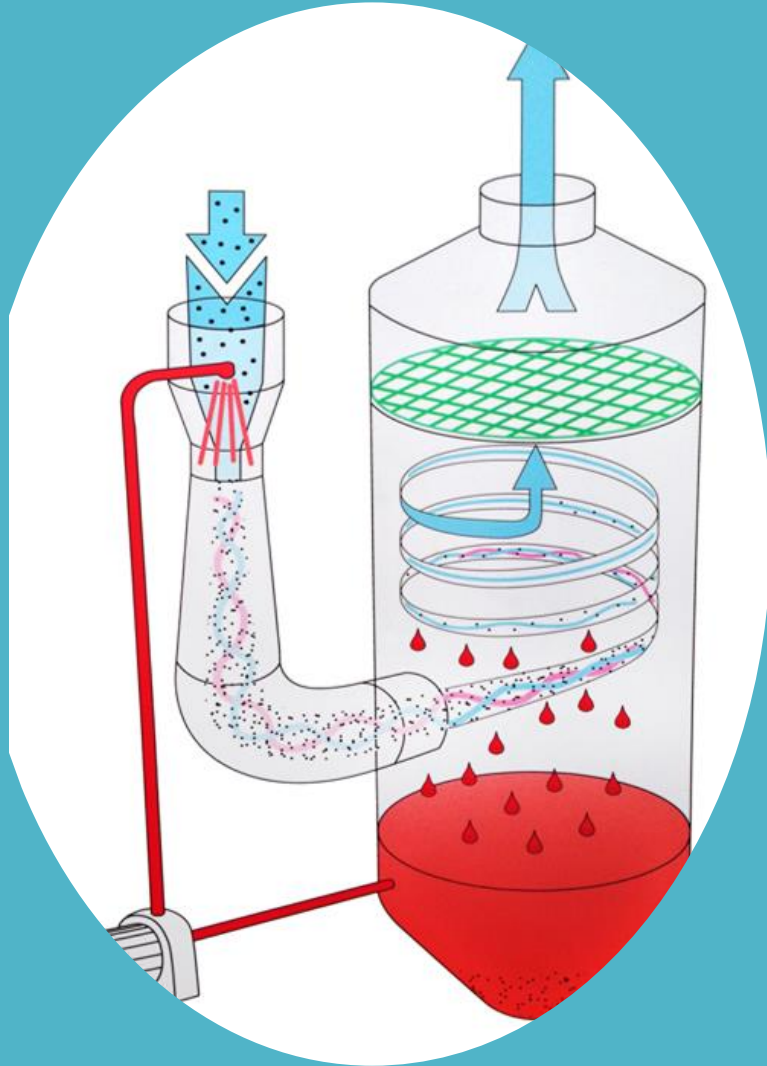
Units: GHG emissions



Total: Refers to the absolute amount of GHG emissions from international shipping.

Intensity: Carbon dioxide (CO<sub>2</sub>) emitted per tonne-mile.

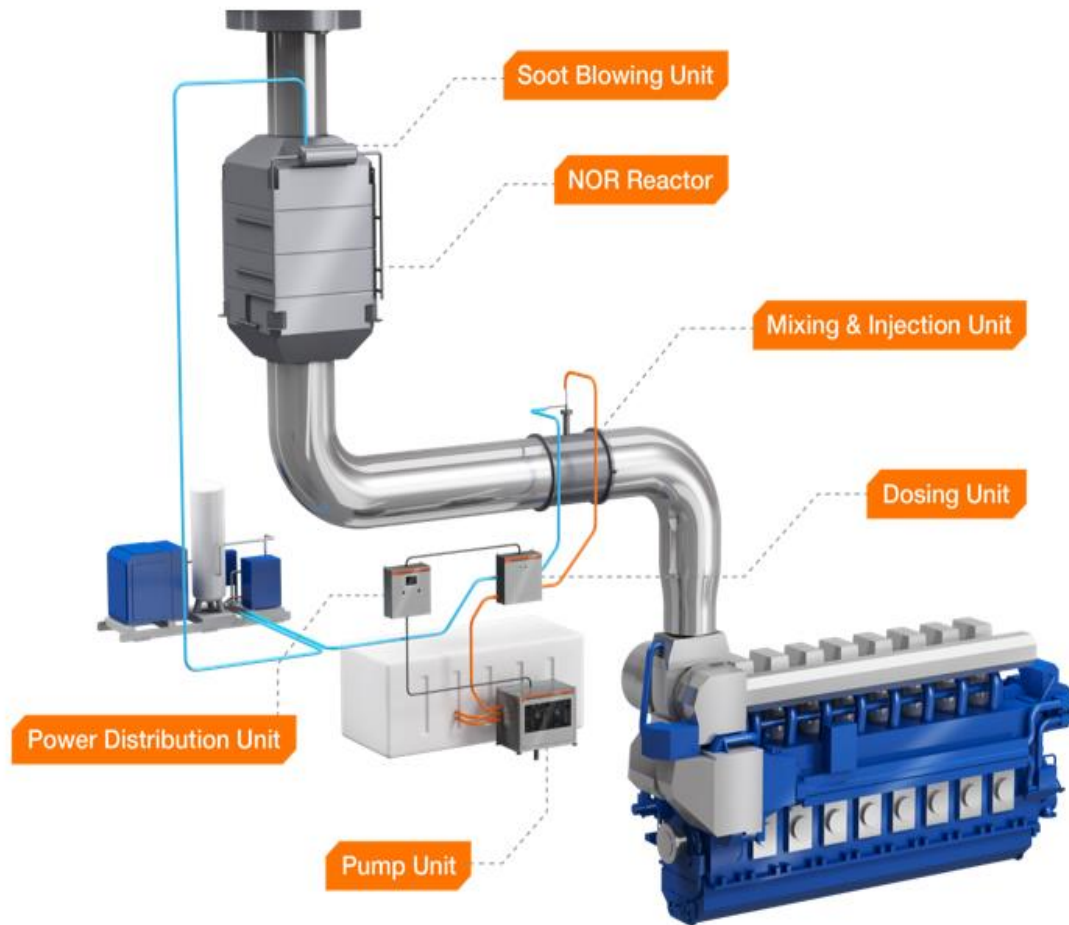
<sup>a</sup>Note that the the business-as-usual emissions are illustrative, and not consistent with the emissions baseline used in our modelling (Chapter 6).



## Scrubbers:

- IMO guidelines agreed
- EU Parliament discussions on ban because of washwater content of particles
- Possible closed loop zones in ports and coastal areas
- The use of low sulphur fuels comply with regulations however particles still ends up in the environment
- Scrubbers offer the most climate friendly option for a clean environment

# NO<sub>x</sub>



NO<sub>x</sub> Tier III emission standards are applicable only in NECA (NO<sub>x</sub> Emission control areas ). Outside NECA , Tier II standards are applicable.

NECA: North American, U.S. Caribbean & European.

Tier III standards are applicable to ships built on or after 1 Jan 2016.



# PTX Market – Green Fuels, Shipping

Maersk Line (17% of global container shipping):

"The only possible way to achieve ... decarbonisation in our industry is by fully transforming to new carbon neutral fuels “.

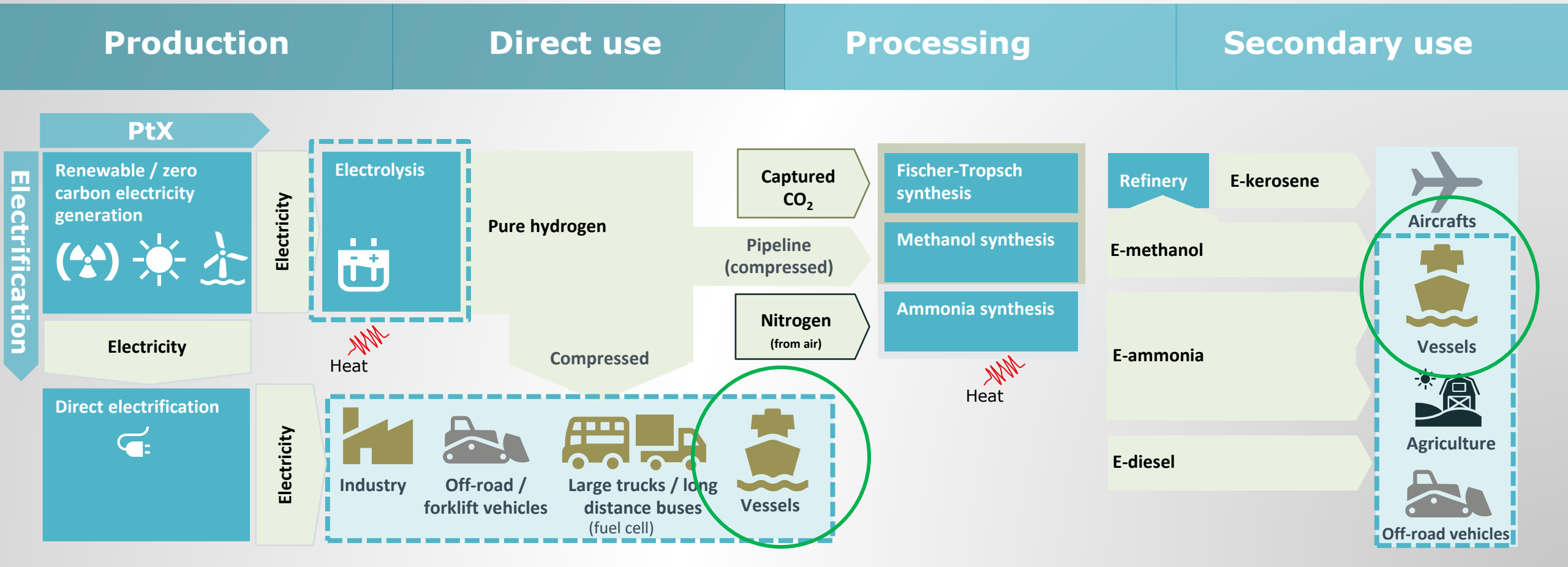
"The next 5-10 years are ... crucial. We will invest significant resources for innovation and fleet technology to improve the technical and financial viability of decarbonised solutions“.

*(Extract from Maersk press release, December 4, 2018)*

The entire electricity production from the Danish offshore wind farm Horns Rev 3 (407 MW), converted into green ammonia, would just be enough to keep two large, energy-efficient container ships sailing.



# 70% CO<sub>2</sub> reduction – a strong business opportunity for Danish Industry and Shipping: Direct Electrification, Green Hydrogen and Power-to-X



Common goal of ShippingLab:

“To create Denmark’s first autonomous, environmentally friendly ship”

### Work Package 3 - Decarbonization

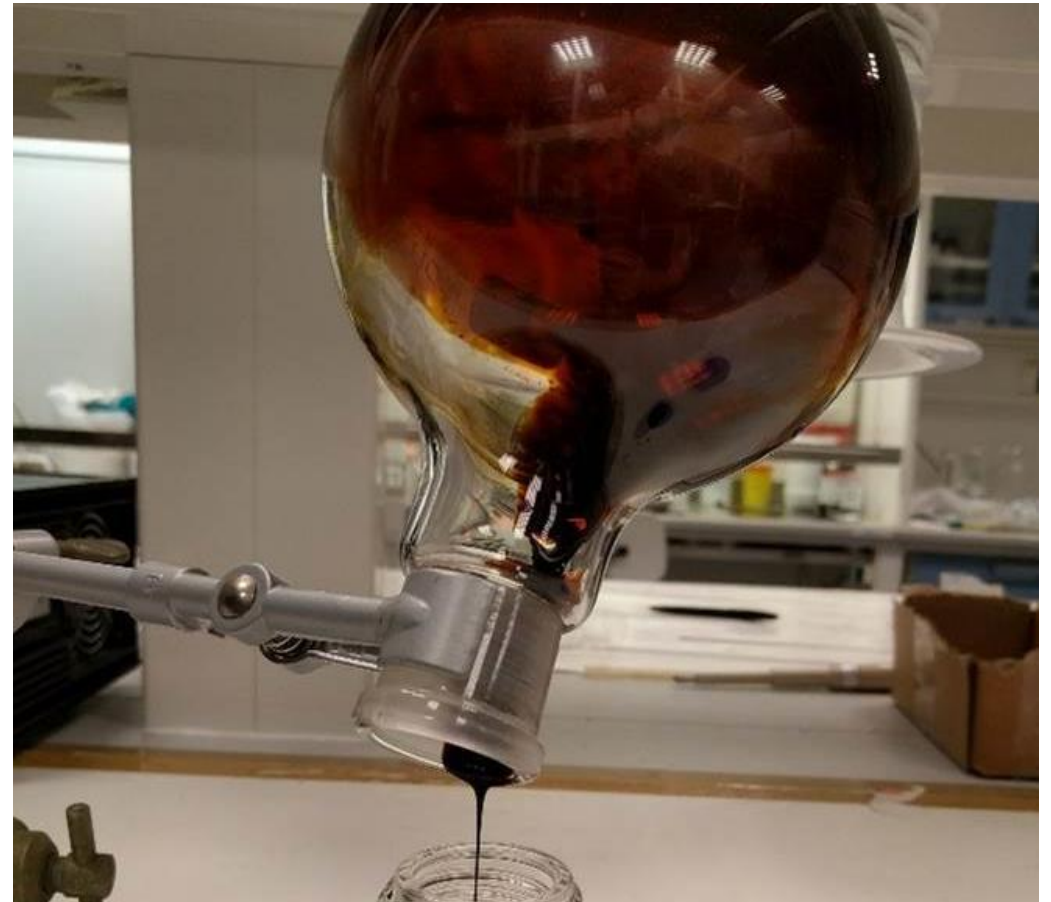
Develop solutions with the aim of enabling full-scale emission free area operation for shipowners

#### *Activities*

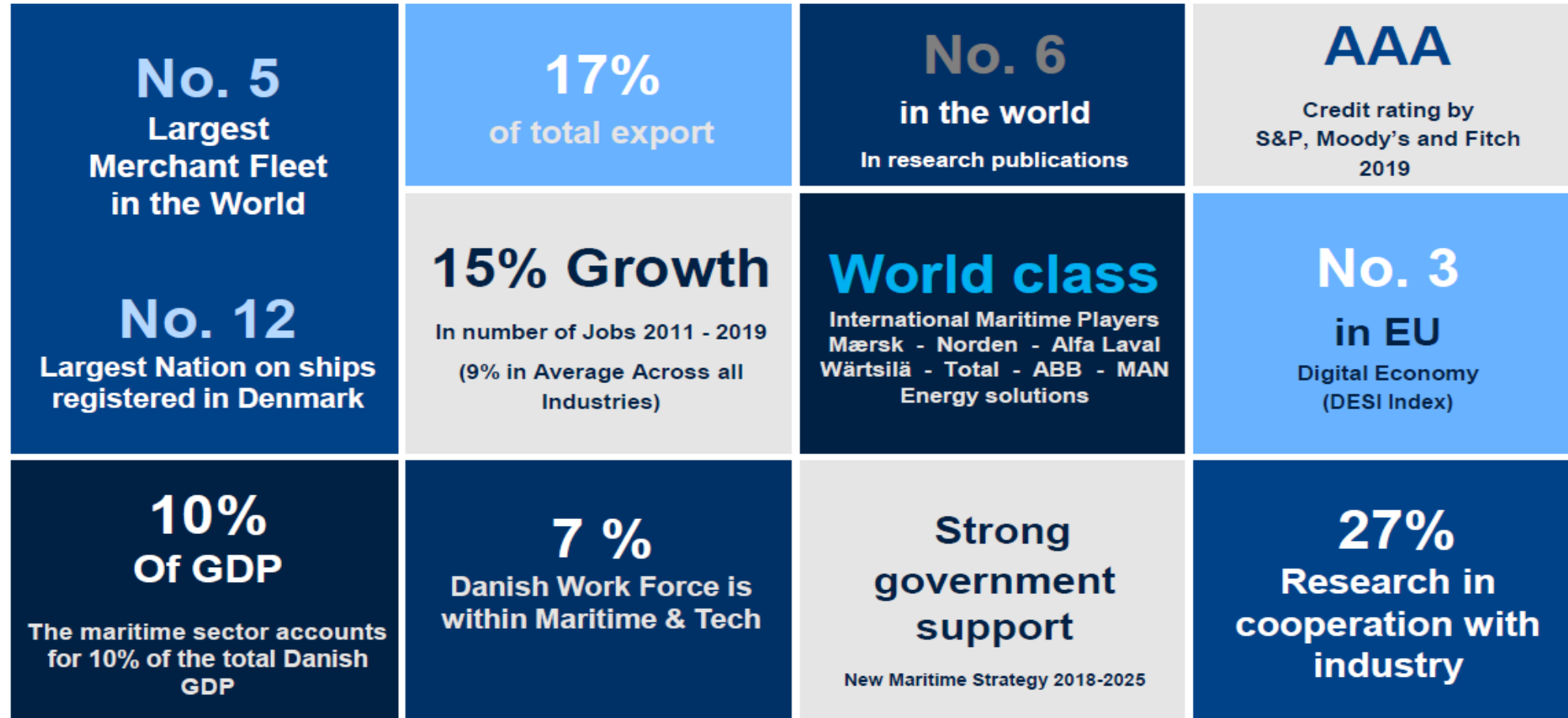
CO2 Negative ISO8217 bio-bunker

BioFuel Oil (BFO): A scalable and sustainable drop-in fuel for shipping

Hybrid H2 dredger for Hvide Sande Port



# Denmark and the maritime sector at a glance



# Center for zero carbon shipping

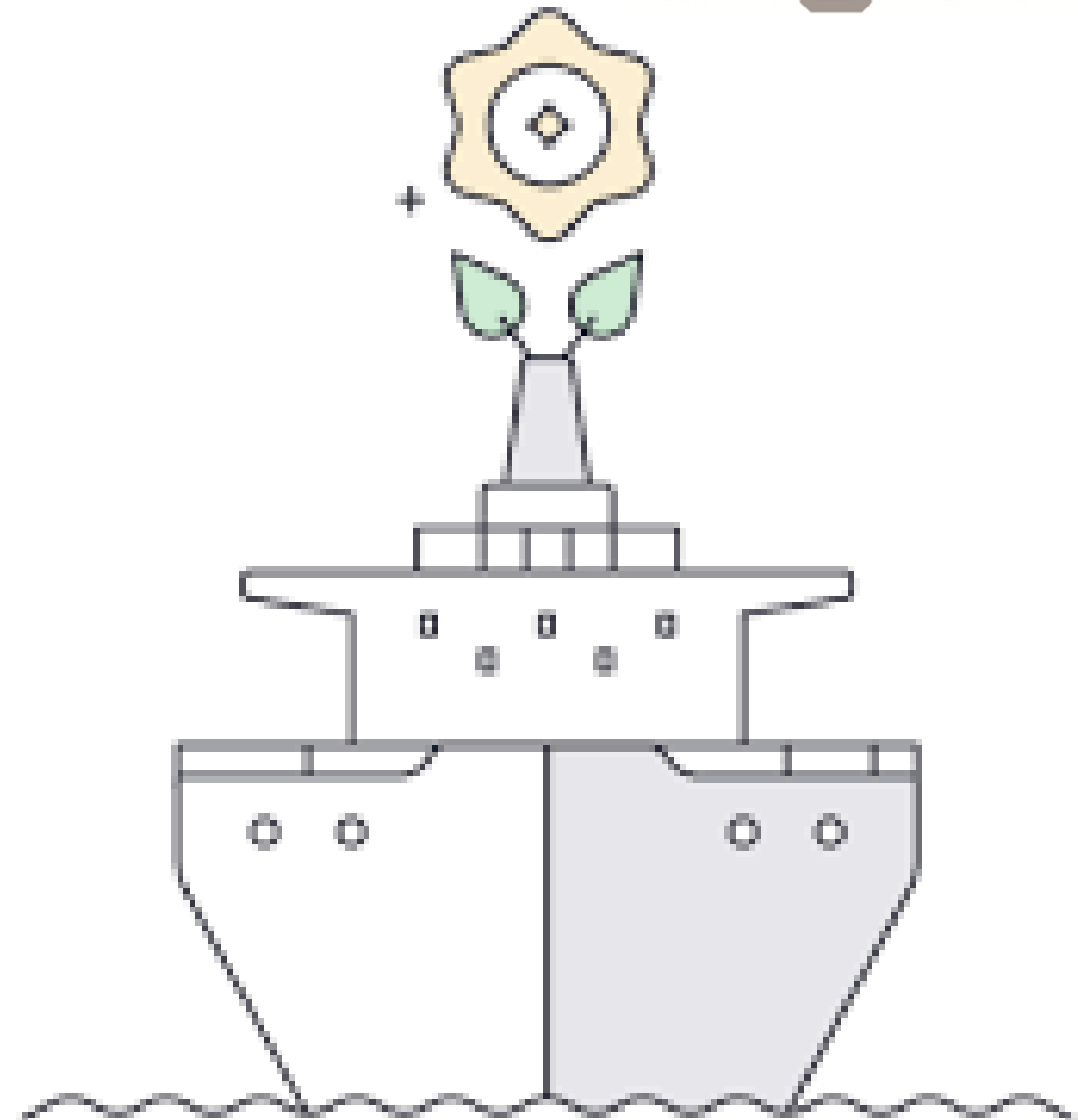
The Maersk Center for Zero Carbon Shipping - announced June 2020.

“Start-up donation” of USD 60 million from the A.P. Moller Foundation.

Develop new fuel types and technologies to decarbonize the maritime sector.

Founding members:

ABS, Maersk, Cargill, MAN Energy Solutions, Mitsubishi Heavy Industries, NYK Lines, Siemens Energy, AlfaLaval, D/S Norden.



# Marine brændsler frem mod 2030 og videre



Residual



Distillates



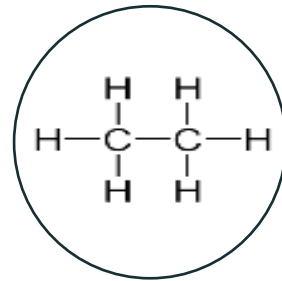
Methane



Methanol



LPG



Ethane



Biofuel  
(2<sup>nd</sup>+3<sup>rd</sup> gen.)



Ammonia

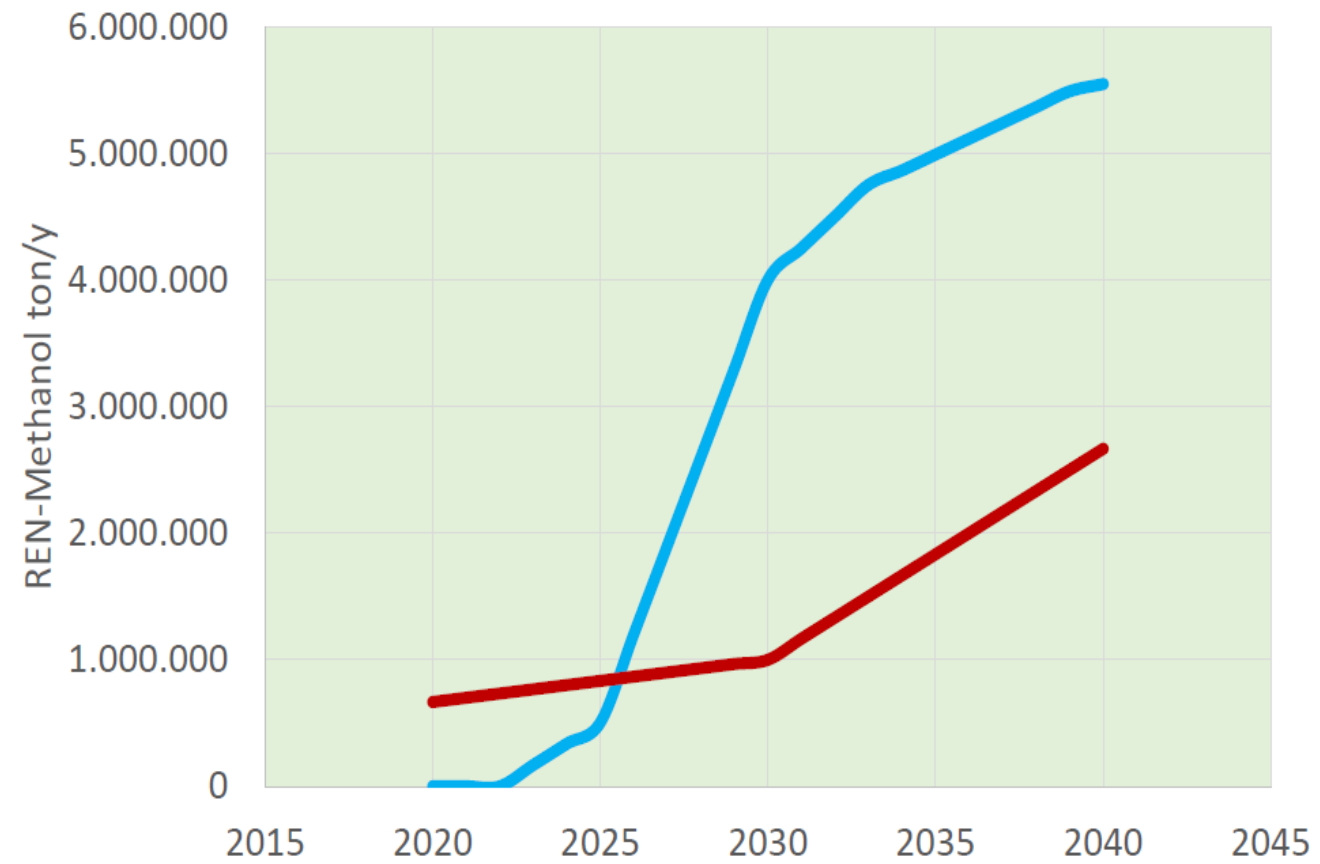
**Teknologileverandører må understøtte alle**





- e-Methanol
- Biomethanol

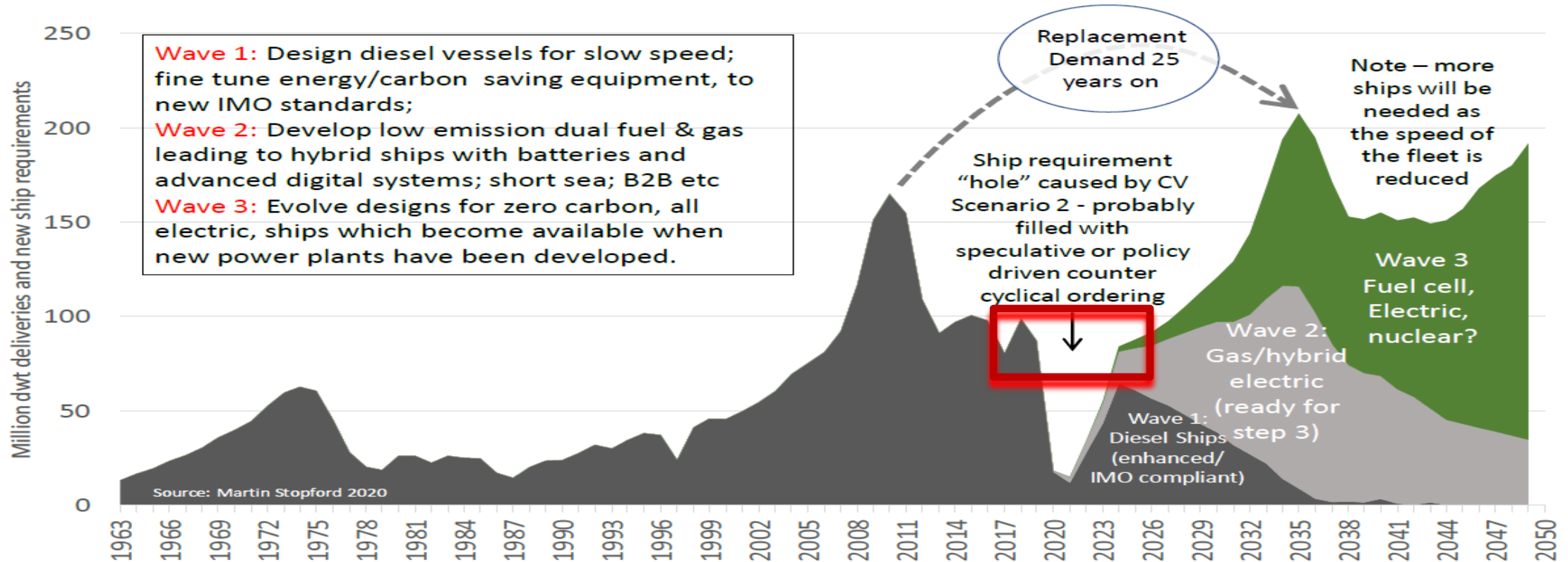
REN-methanol potential



# A tremendous order-drought in the years ahead...but demand for (green) ships will come back in the long run

**Post-Covid 19**

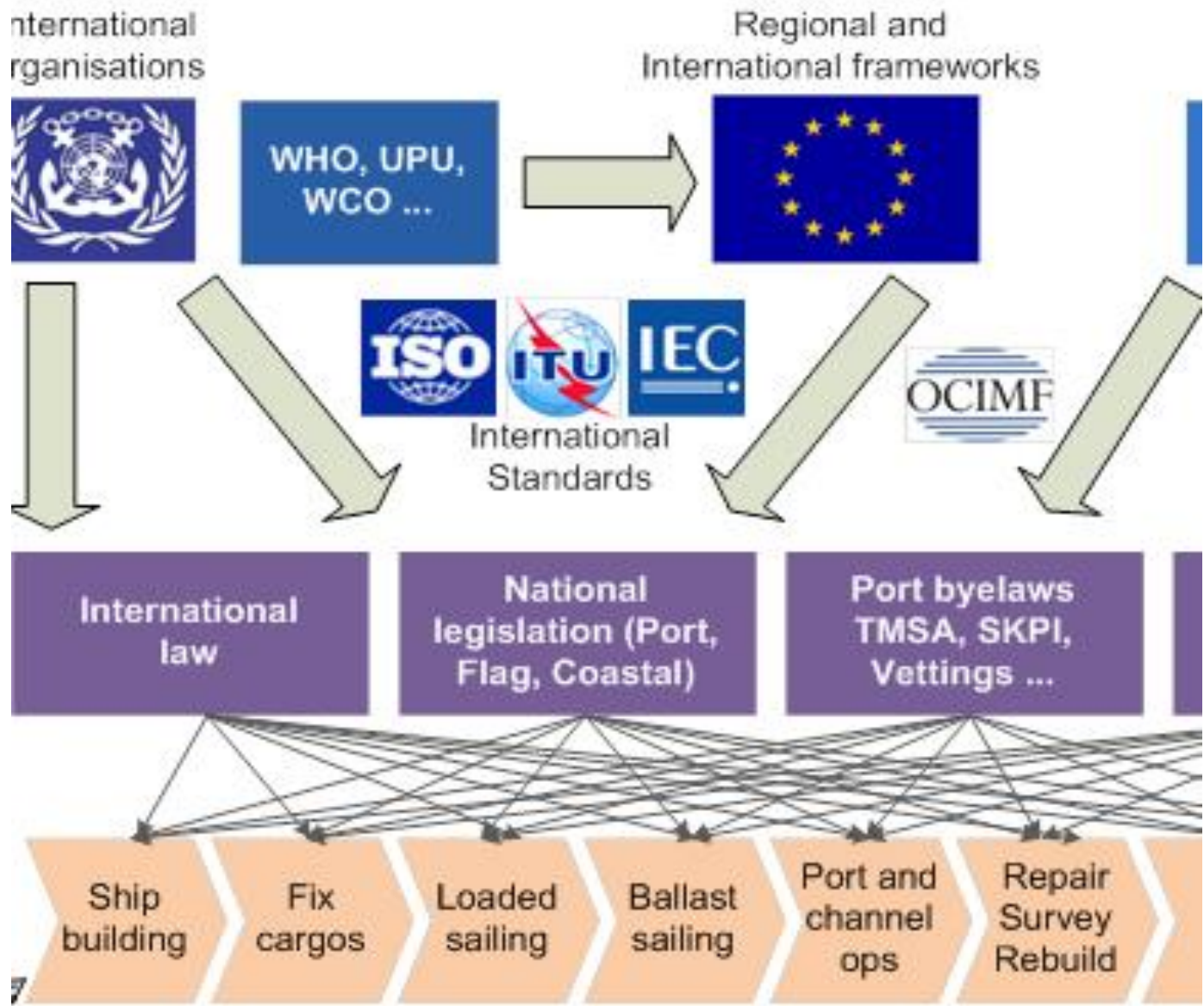
Stopford -Three Maritime Scenarios 2020-2050



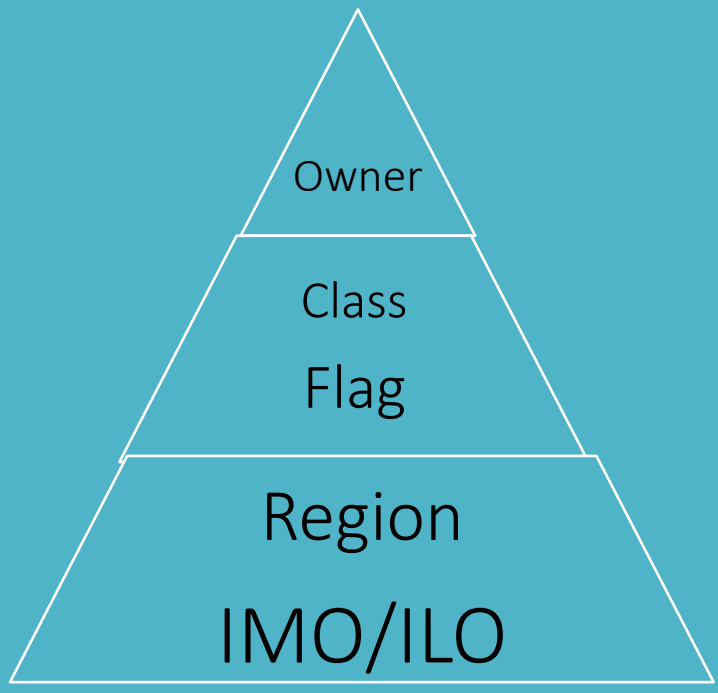
Please note that this is a scenario to illustrate the way things might develop, not a forecast, it will almost certainly be wrong!

Figure 4: Technology scenario 2 to reach IMO 2050 CO2 target (based on trade scenario2 and shipbuilding scenario 2)





# Compliance and regulation



# More Ambitious Newbuilding Standards & New Standards for Energy Efficiency of Marine Equipment and Systems

Many newbuilds already exceeds current EEDI requirements

## Requirements for Existing ships

short-term measures:

modified EEDI at major conversion

technical retrofitting requirements for existing ships (EEXI); and

operational energy efficiency requirements (modified SEEMP)



# Opsummering

Business cases are key for Green investments: what is the pay-back time?

Acceptable pay-back time is in the order 12-36 months from a shipping company's perspective. Because of the fuel price, often difficult to achieve.

New buildings and Retrofit options have problems meeting strong requirements for pay-back times.

For the ship owners and operators to invest, there has to be either a financial benefit or a mandatory "license to operate", i.e. compliance requirements.

The new IMO regulation (CII, EEXI) is an attempt to break the barriers by introducing levels of acceptable CO2 emission per transportation work. It is in our opinion a necessary step to change the industry.

Will legislation become strict enough to drive a necessary change towards Greener Shipping?

The forbidden word: CO2 emission taxation?

Can the market change, so investments in Green technologies come naturally, instead of through legislation?

# Konklusioner

## UNDGÅ

Hønen & ægget situation hvor energiproducenter og kunder afventer hinanden

## BRUG FORDELE OM

The green agenda

*Overcapacity-demand/supply logistics*

Digitalisation

## FREMME

Teknologiudvikling

Regeludvikling som følger med tiden

Fordele for first movers

Samarbejde industri & myndigheder

Prissætning / afgift

Infrastruktur på plads

Any Questions?

Danish  Maritime