eFuels in inland navigation – the role of ports

Dr. Tobias Block, eFuel Alliance,

21st March 2023, DANUBE COMMISSION

OUR MEMBERS

eFuel alliance

MORE THAN 170 COMPANIES, ASSOCIATIONS AND CONSUMER OGRANIZATIONS IN 17 COUNTRIES WORLDWIDE, INCLUDING:

HIF

IVECO

Synhelion

HELLENiQ ENERGY

SIEMENS energy

ADAC

mazda

eni

REPSOL

ExxonMobil

BOSCH

METHANOL INSTITUTE

UNITI

NESTE

HALDOR TOPSOE

Webasto Feel the Drive

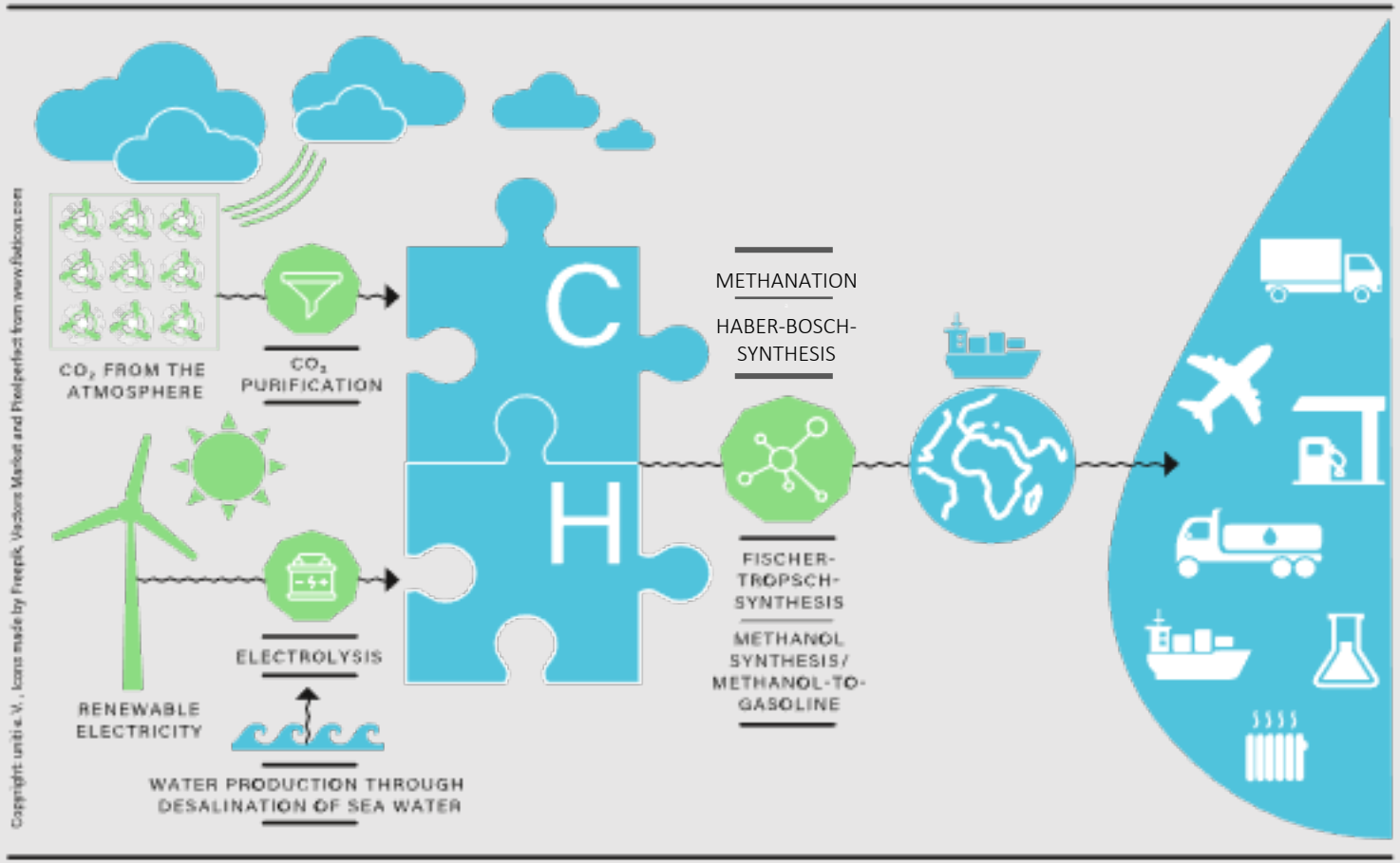
INERATEC

EFUEL ALLIANCE – A PLATFORM WITH A CLEAR VISION

We are a **lean and fast-lobbying "trailblazer"** created to foster a strong renewable fuel market within the next 2-3 years, representing the whole value chain of eFuels.	We stand for **fair competition** and a **level-playing field** for all relevant emission reduction solutions. We are clearly committed to more climate protection and are not fighting against any single technology.
Now or never – **the Green Deal is the unique opportunity** to change the regulation and achieve more holistic political decisions	We aim to **initiate attractive business** models to develop innovative fuel technologies in Europe.

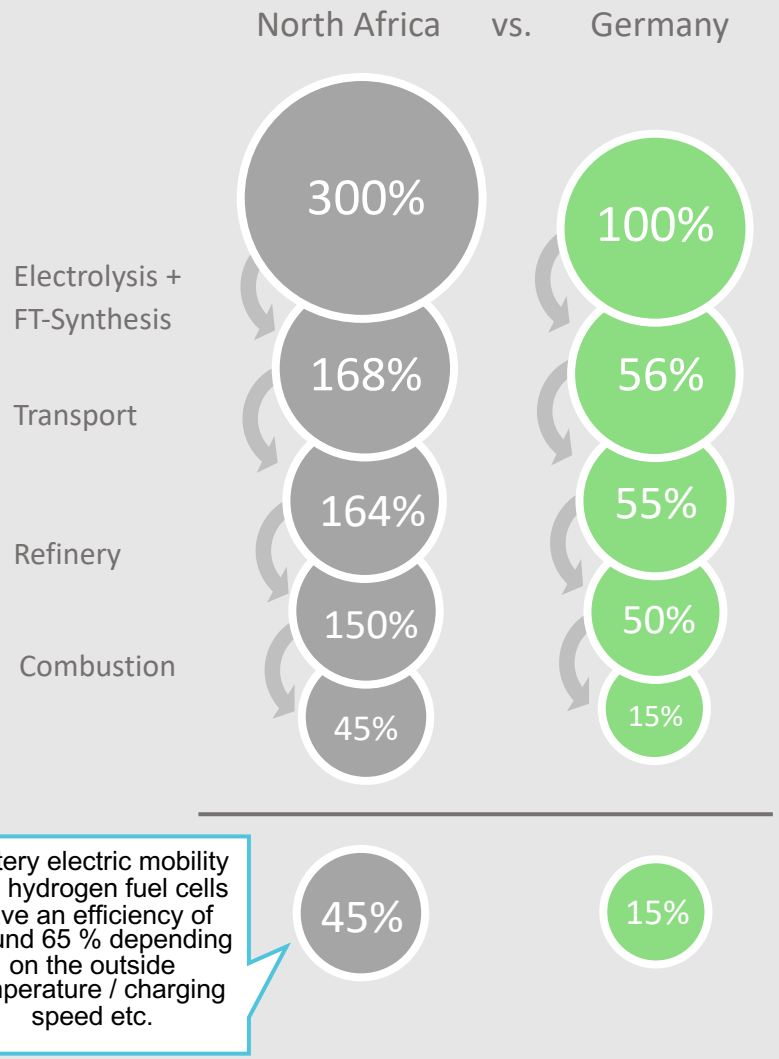
WHAT ARE EFUELS? CHALLENGES AND OPPORTUNITIES FOR MARITIME APPLICATIONS

HOW ARE eFUELS PRODUCED?

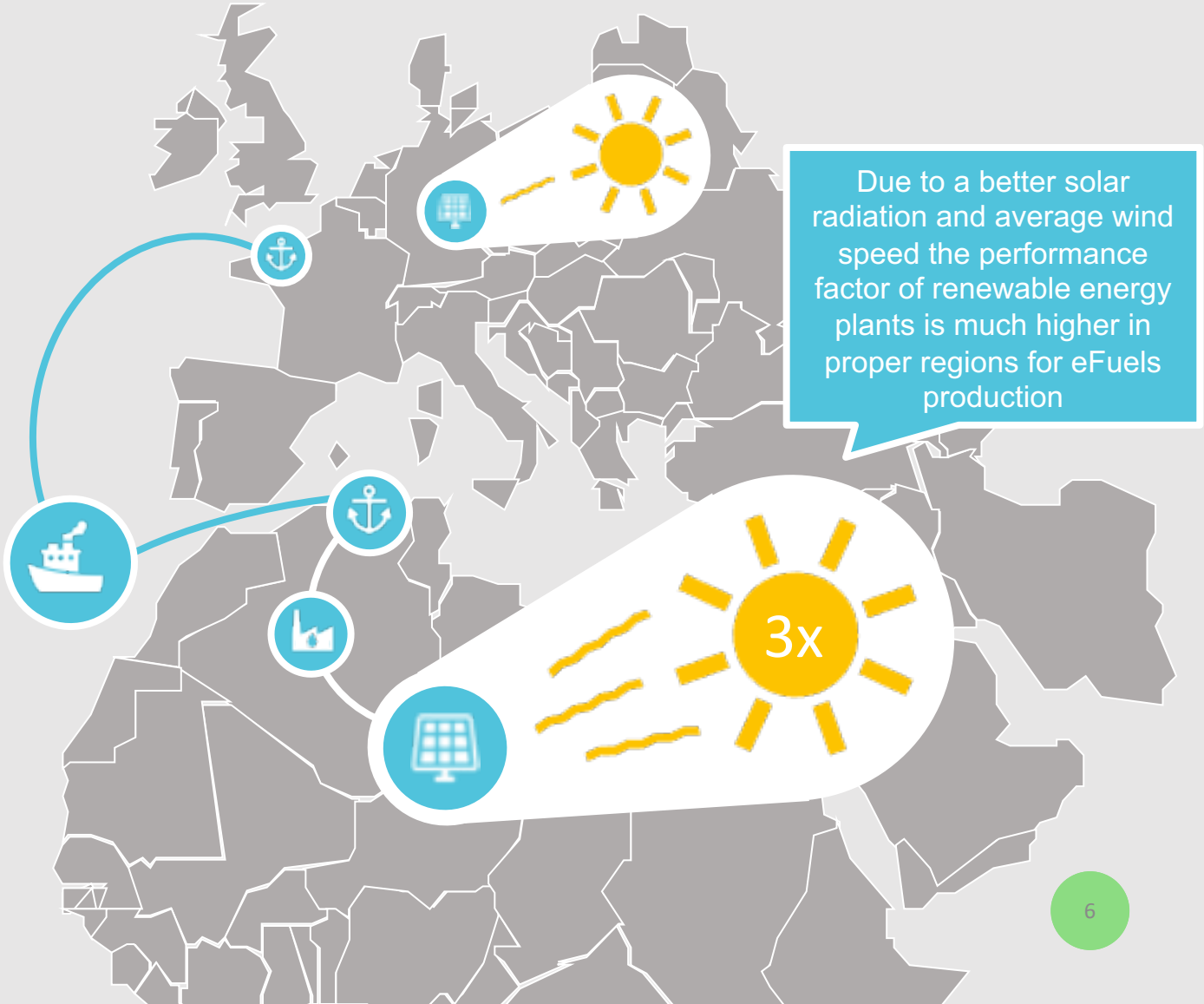


- Extraction of hydrogen from water by electrolysis using renewable electricity
- Hydrogen and CO2, directly captured from the atmosphere, are converted into a liquid energy carrier, by using e.g. Fischer-Tropsch synthesis.
- Power-to-X (PtX): Renewable electricity is converted into a synthetic, multi-purpose fuel with drop-in ability
- Climate-neutral process, no additional greenhouse gases are produced

EFFICIENCY DEPENDS ON THE PLACE OF PRODUCTION

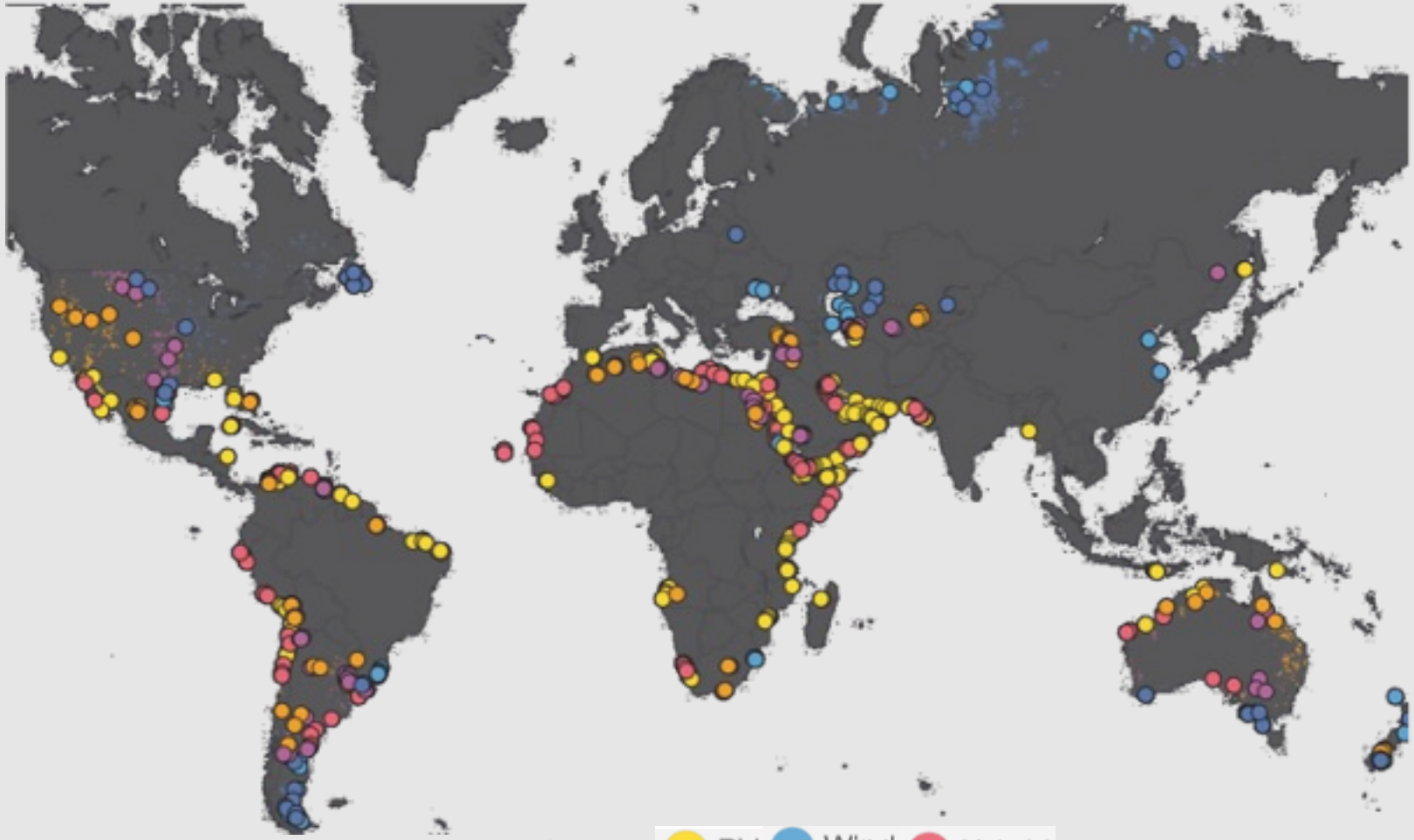


Battery electric mobility and hydrogen fuel cells have an efficiency of around 65 % depending on the outside temperature / charging speed etc.



Due to a better solar radiation and average wind speed the performance factor of renewable energy plants is much higher in proper regions for eFuels production

AVAILABILITY CHECK: PTX POTENTIAL WORLDWIDE



Fraunhofer IEE explored the potential outside the EU for the **production of green H2** and **climate-neutral synthetic fuels**

85,000 to 88,000 TWh of climate-neutral synthetic fuels could be produced outside Europe

Global energy consumption by transport in 2019 totaled 33,603 TWh – **global shipping: 4,500 TWh**

ALTERNATIVE PROPULSION TECHNOLOGIES IN SHIPPING – WHERE IS THE JOURNEY HEADED?

eLNG/SNG
via methanation synthesis

eDiesel
via Fischer-Tropsch synthesis

eMethanol
via Methanol synthesis

eAmmonia
via Haber-Bosch synthesis

Hydrogen

Li-ion batteries

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Not suitable for long voyages due to low energy density

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via methanation synthesis

- ✓ LNG is global energy carrier with long experience
- ✓ LNG infrastructure being expended due to energy crisis
- ✓ Can be mixed by to fossil LNG
- x Risk: methane leakage

eMethanol

via Methanol synthesis

- ✓ Can be mixed to fossil methanol
- – New to shipping, but well-known chemical product
- – Infrastructure available if chemical products are traded

eDiesel

via Fischer-Tropsch synthesis

- ✓ Maritime fuel oil is the standard, eDiesel can be mixed by
- ✓ Distribution grid and refueling infrastructure available at all ports
- ✓ Compatible to existing fleet stock

eAmmonia

via Haber-Bosch synthesis

- ✓ Can be mixed to fossil ammonia
- ✓ Cheaper (based on Nitrogen, not CO2)
- – New to shipping, but well-known chemical product
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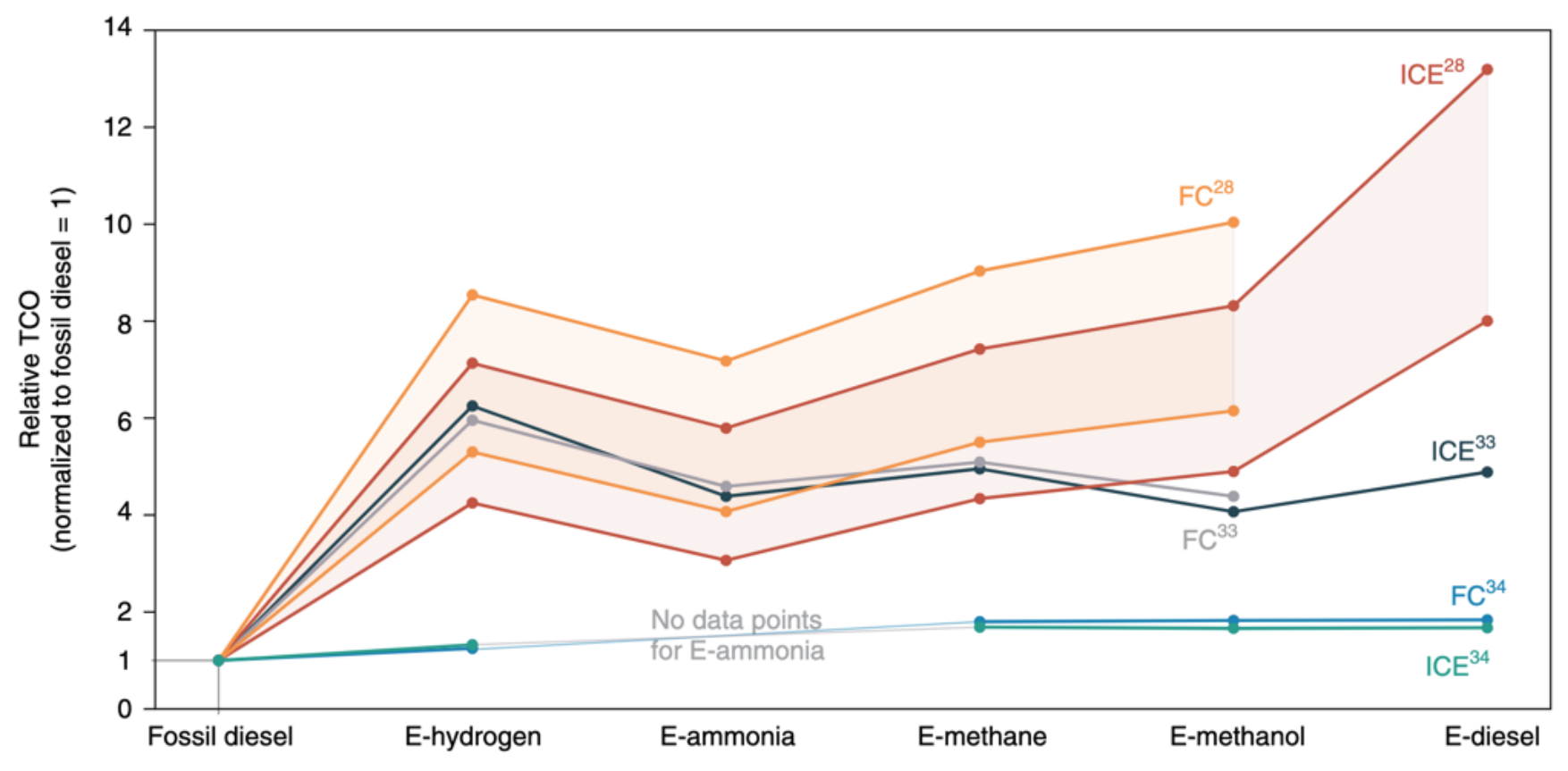
There is no superior technology! Technology mix probable

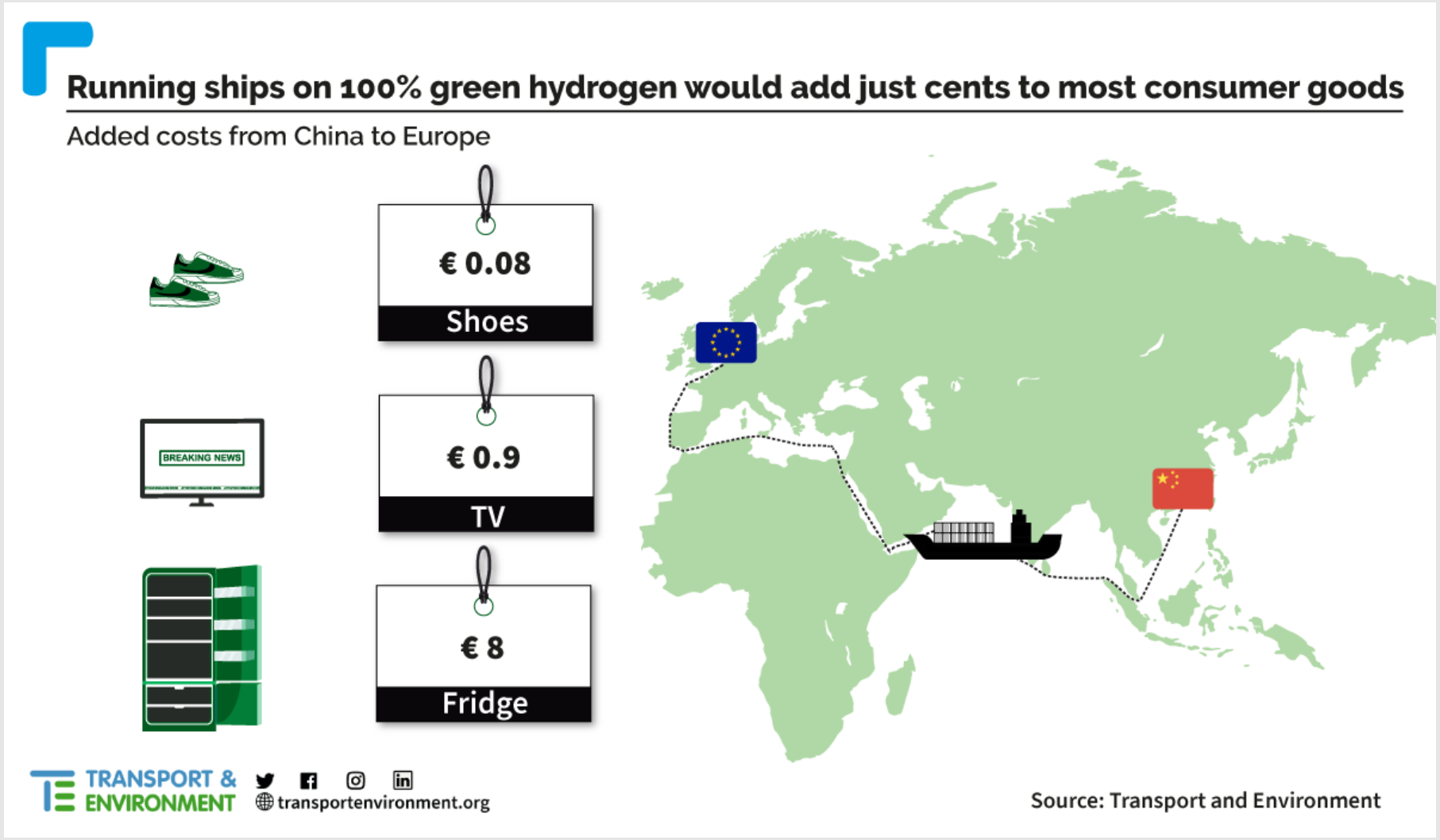
EFUELS MULTIPLE TIMES MORE EXPENSIVE THAN FOSSIL FUELS



- Bandwidth due to different ship types and production technologies e.g., electrolysis, CO_2 source.
- eDiesel is the most expensive eFuel while eAmmonia is the cheapest (no CO2 source).
- Open TCO battle between hydrogen, eLNG, eAmmonia and eMethanol
- But are costs the only criteria?

Source: Stolz, B., Held, M., Georges, G. *et al.* Techno-economic analysis of renewable fuels for ships carrying bulk cargo in Europe. *Nat Energy* **7**, 203–212 (2022).

…BUT CALCULATED ON CONSUMER GOODS THE PRICE IMPACT OF EFUELS IS RELATIVELY LOW

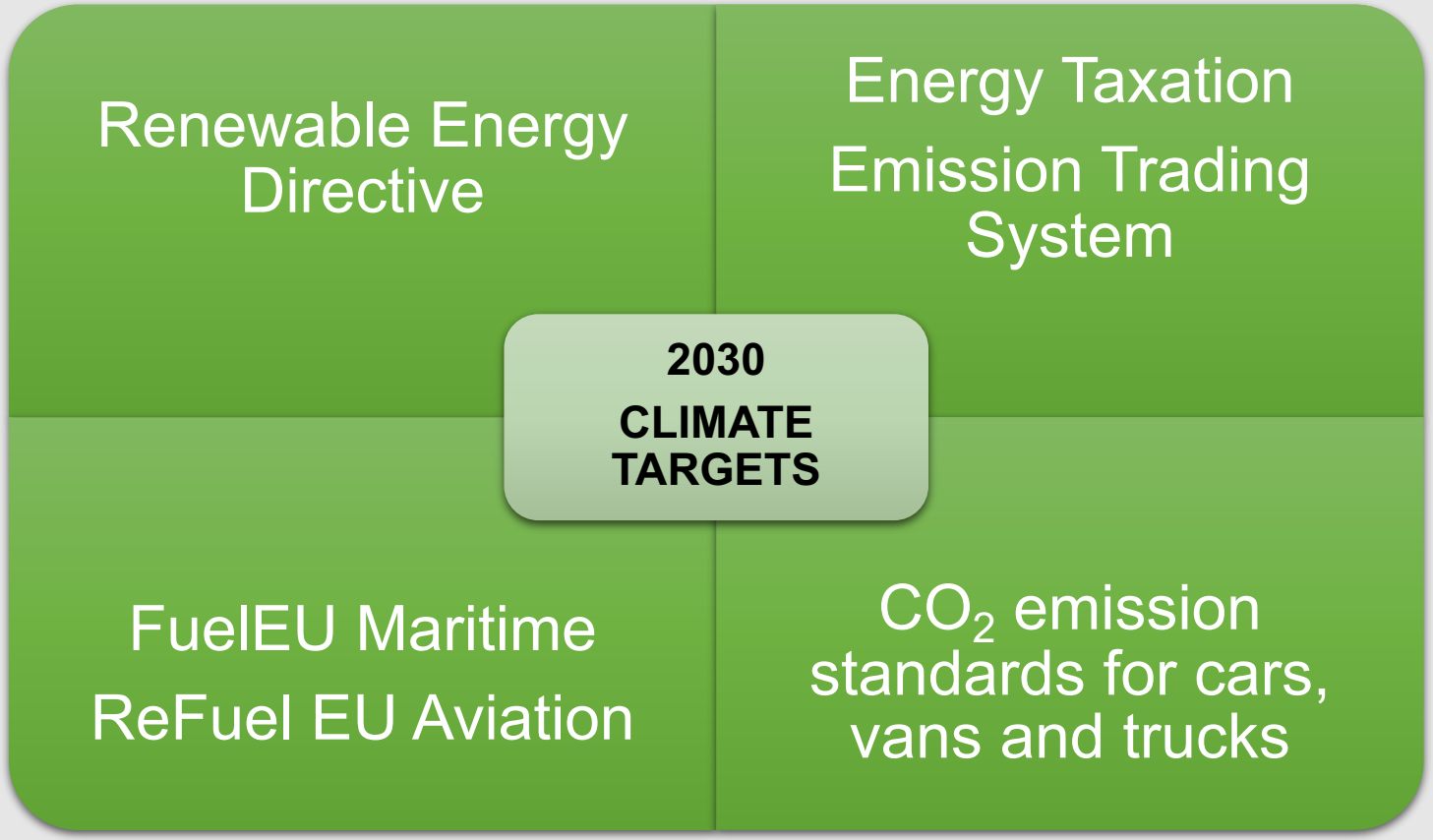


WHAT KIND OF POLITICAL FRAMEWORK IS NEEDED?

WHAT ARE THE MOST IMPORTANT LEGISLATIONS FOR eFUELS?

EUROPEAN GREEN DEAL

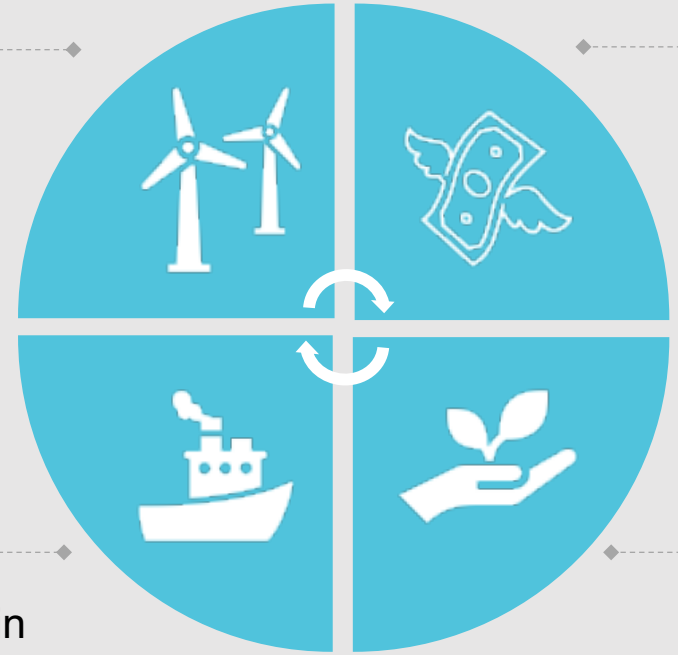
Reduction of GHG emissions by at least 55% by 2030



WHAT WILL IMPACT DANBUE SHIPPING?

Press for a more ambitious revision of the **Renewable Energy Directive**

- Higher GHG reduction targets
- Binding sub-quotas for RFNBOs in Transport and Industry



From 2024 the maritime sector will be integrated in the **Emission Trading System**

- Increase the costs of fossil fuels
- Counts only for vessels with more than 5,000 gross registered tons – **but until 2026 the Commission will check to reduce the threshold to 400 tons**

More ambitious goals and eFuel sub-targets in the **FuelEU Maritime**

- setting long-term investment signals with ambitious eFuel quotas
- Counts only for vessels with more than 5,000 gross registered tons – **the European Parliament proposes to reduce the threshold to 400 tons**

The Commission proposed to include maritime in the revision of the **European energy taxation**

- Unanimous vote in the Council required
- Will increase fuel costs
- Low taxation on renewable fuels decreases price difference to fossil fuels

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