

# Maßnahmen zum Erreichen der Klimaziele

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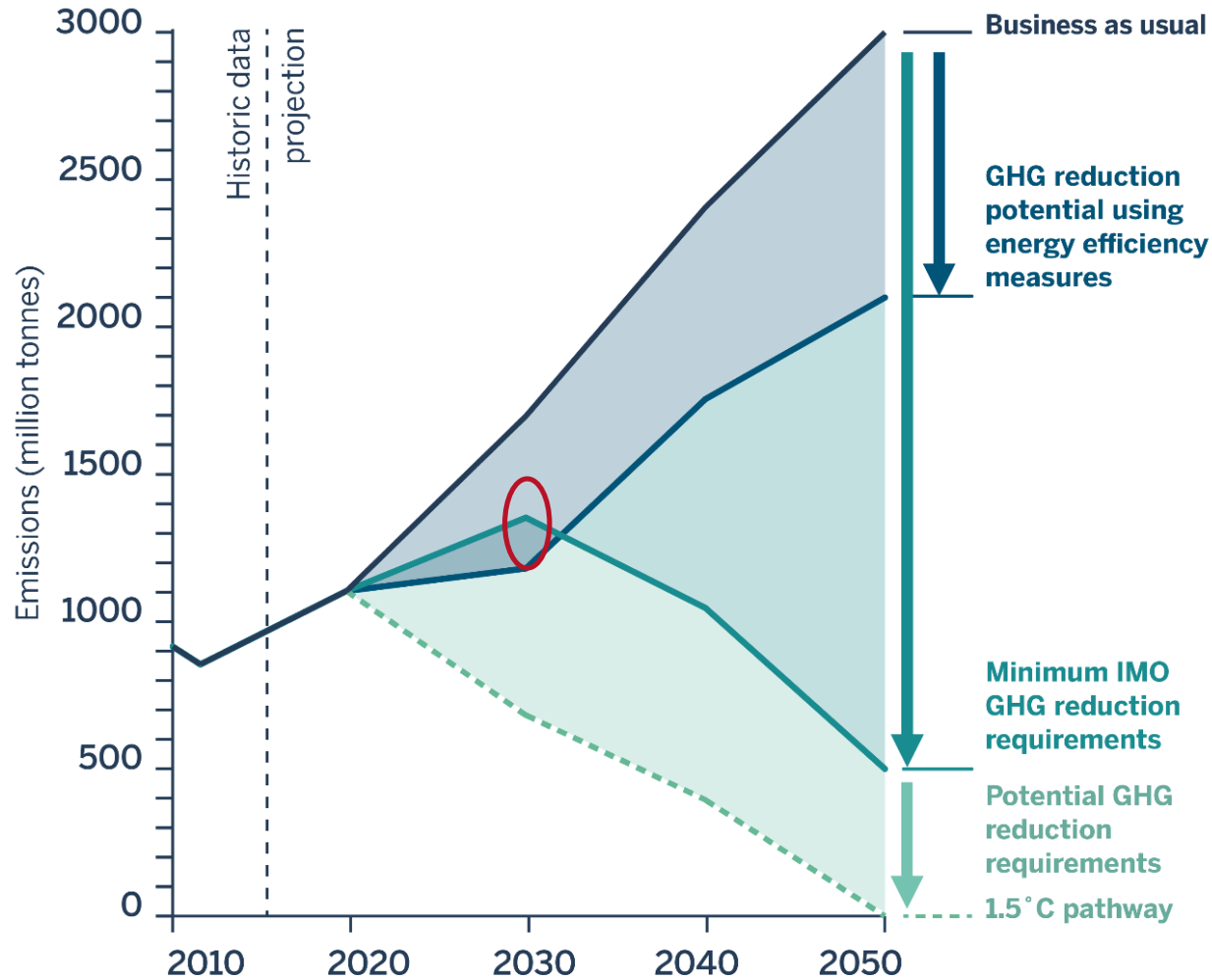
Principal Consultant

4. September 2019



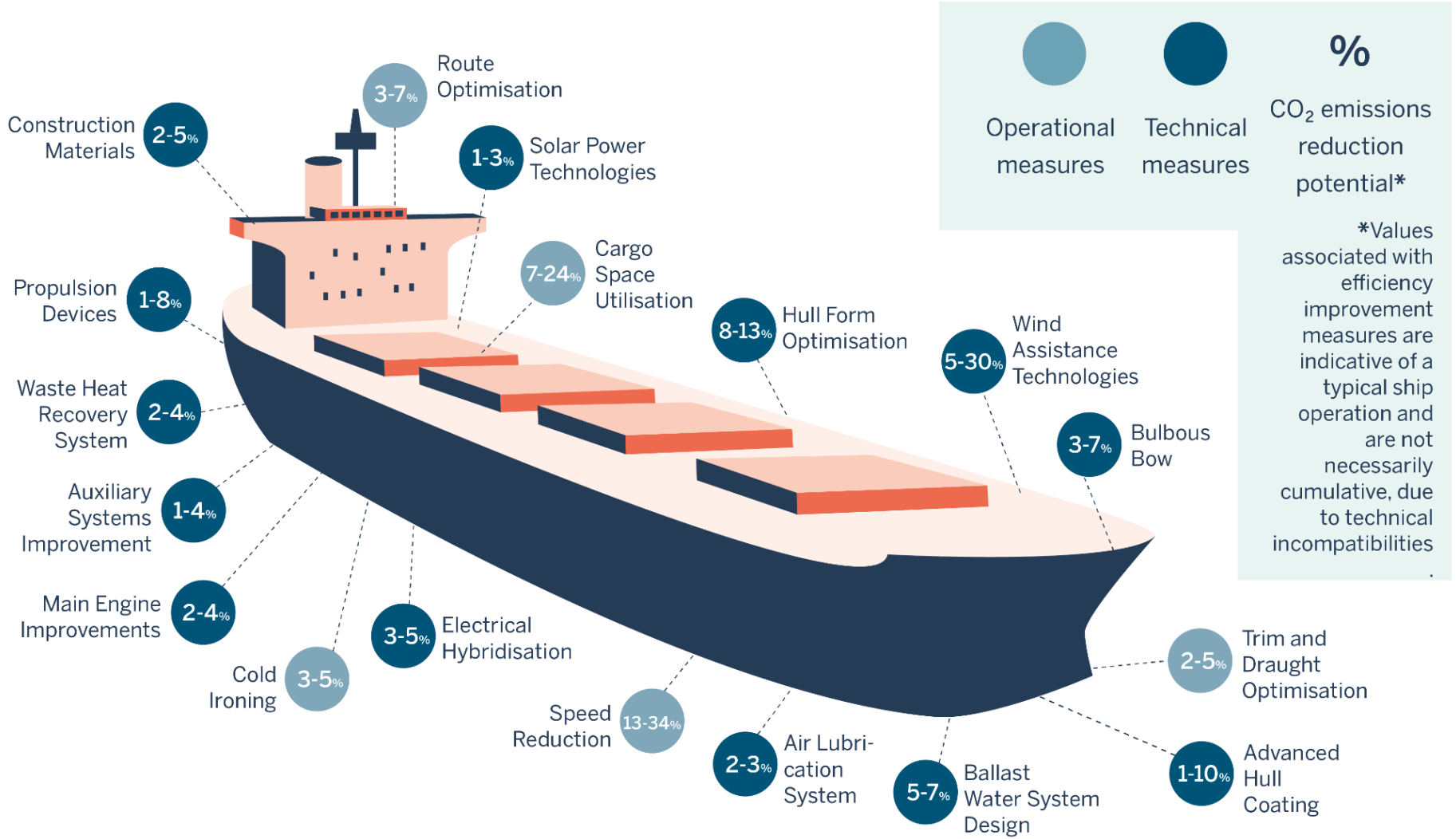
*Maritime consultancy delivering applied solutions for a carbon constrained future*

# Klimaziele der IMO - 2030

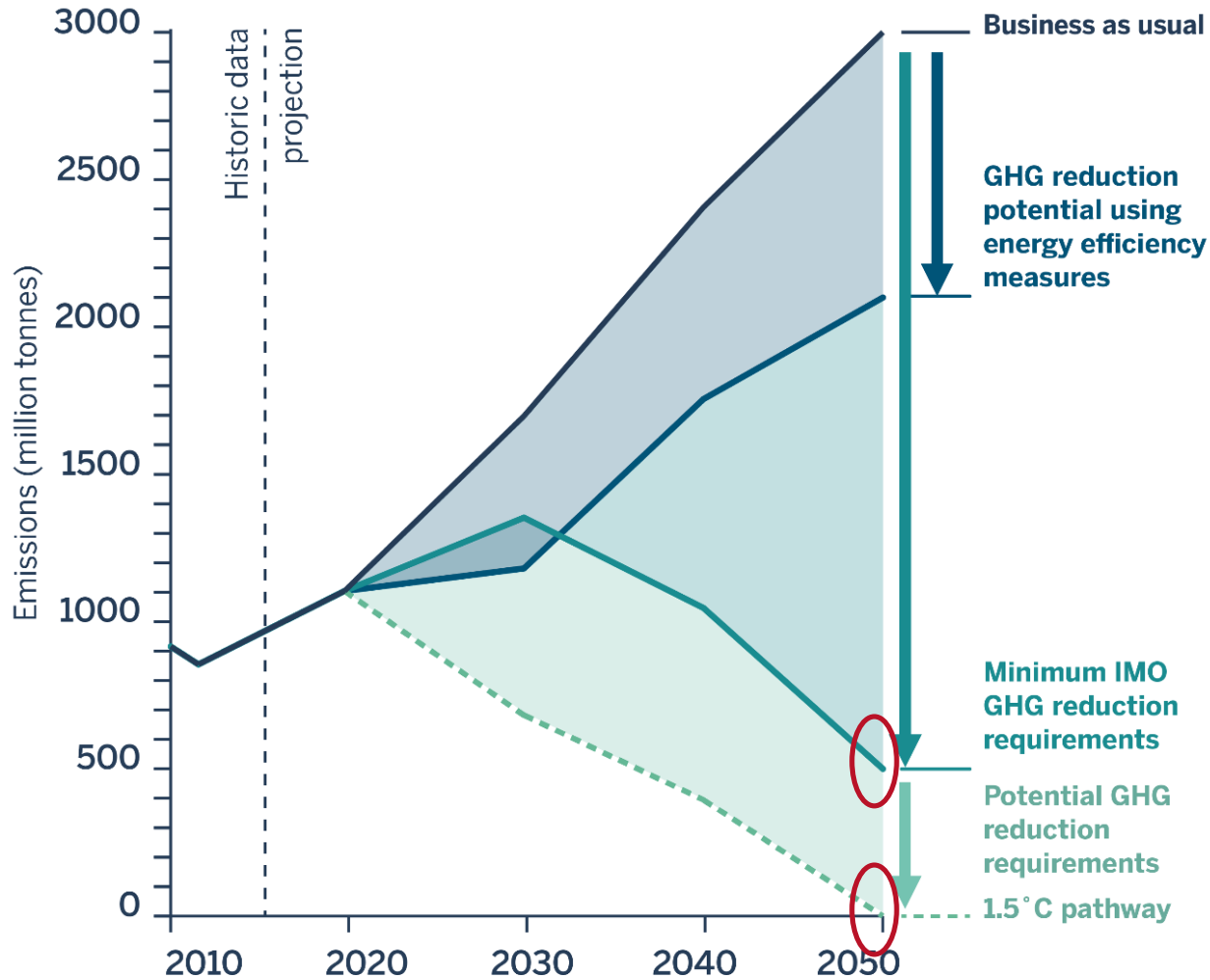


Typical ship operational lifespan 20-30 yrs

# Energieeffizienzmaßnahmen



# Klimaziele der IMO - 2050



Typical ship operational lifespan 20-30 yrs

# Bio-fuels + limitations

## 1<sup>st</sup> Generation

Produced from food resources, such as wheat and sugar.



Resource competition   
Life-cycle emissions

## 2<sup>nd</sup> Generation

Produced from bio-mass resources such as wood and organic waste.



Resource competition   
Land use alteration

## 3<sup>rd</sup> Generation

Produced from sustainably cultivated organic materials such as algae.



Life-cycle emissions   
Commercial viability

## 4<sup>th</sup> Generation

Produced from bio-mass resources in combination with carbon dioxide capture and storage.



Resource competition   
Land use alteration

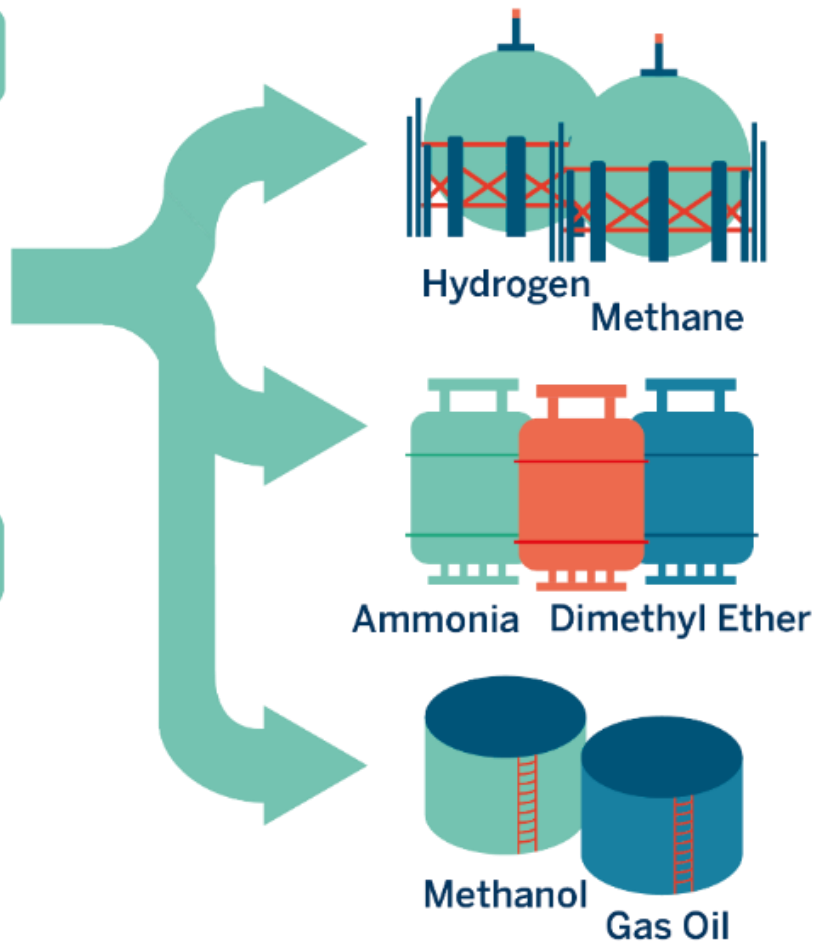
# Renewable energy source options + products

**Electro-fuels**

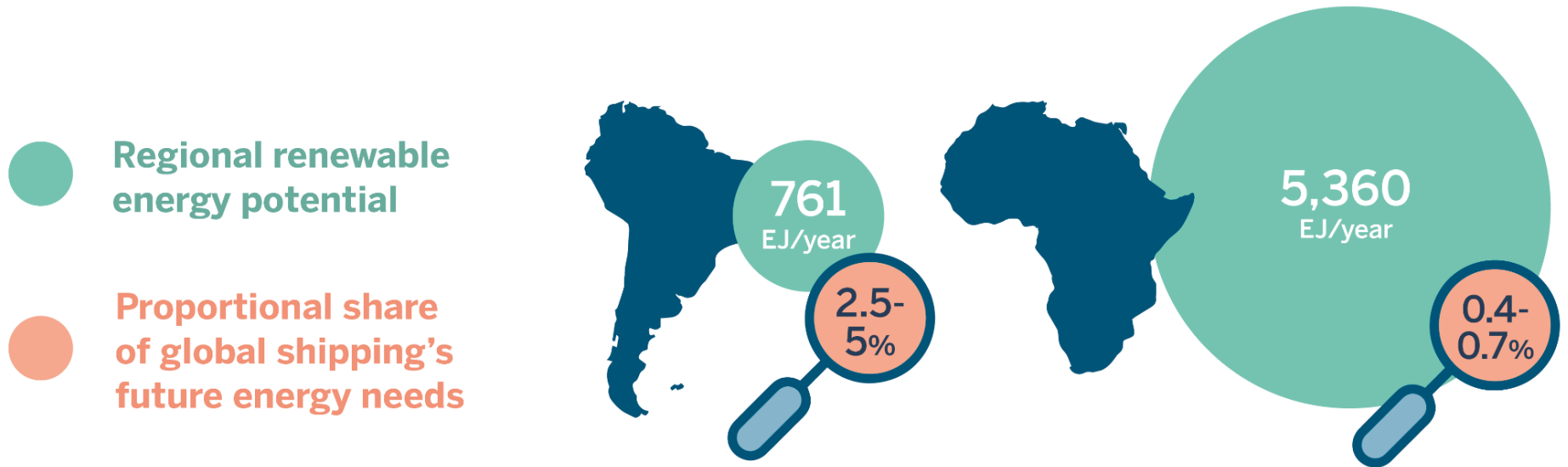
Production of gaseous/liquid zero-carbon electro-fuels from sustainable sources.

**Electrification**

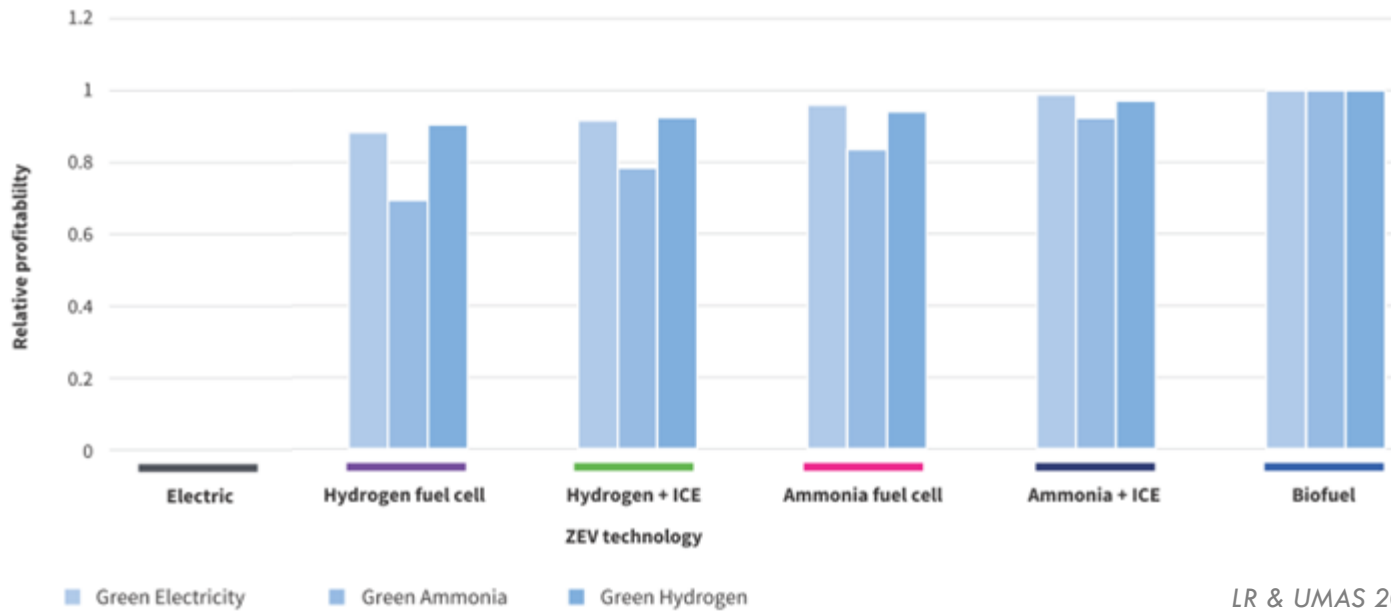
Production of electricity from renewable energy resources in combination with battery storage technology.



# Potenzial für erneuerbare Energieerzeugung

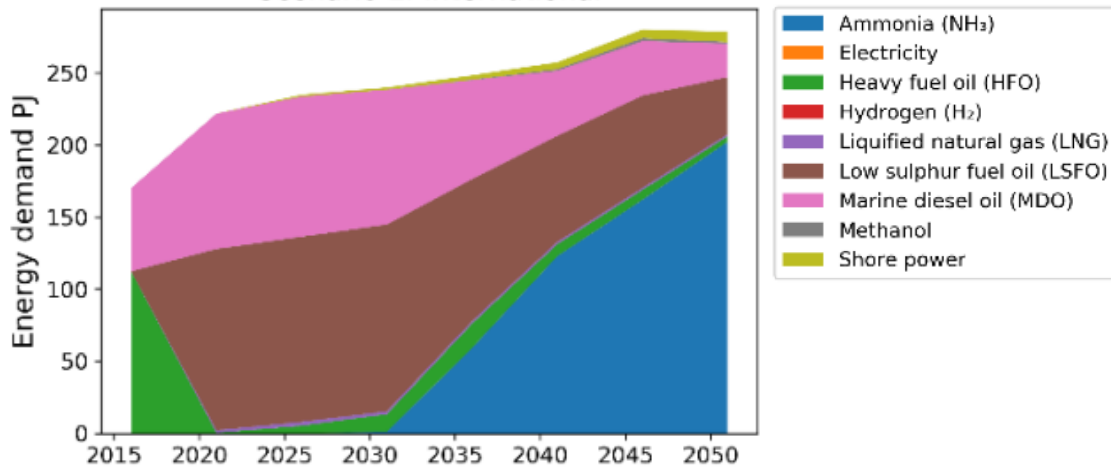


Zukünftiger Energiebedarf der internationalen Schifffahrt: 20-40 EJ/Jahr

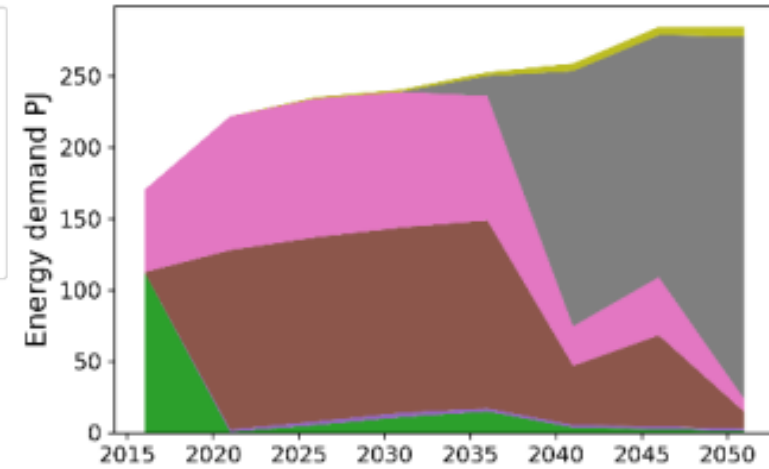


LR & UMAS 2017, Zero Emission Vessels 2030

Scenario E: International



Scenario I: International



UMAS et al. 2019, Reducing the Maritime Sector's Contribution to Climate Change and Air Pollution



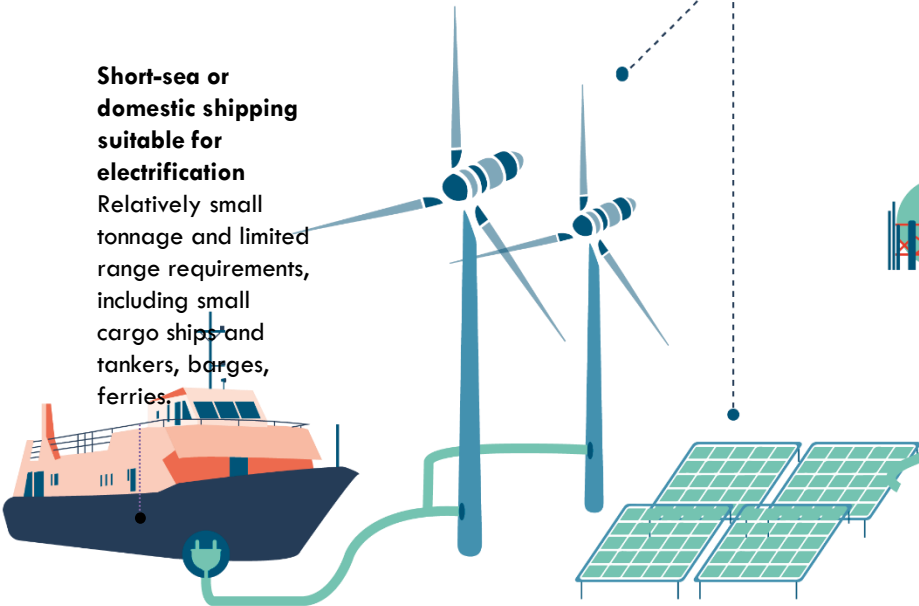
# Keine Patentlösung



Renewable energy generation

**Short-sea or domestic shipping suitable for electrification**

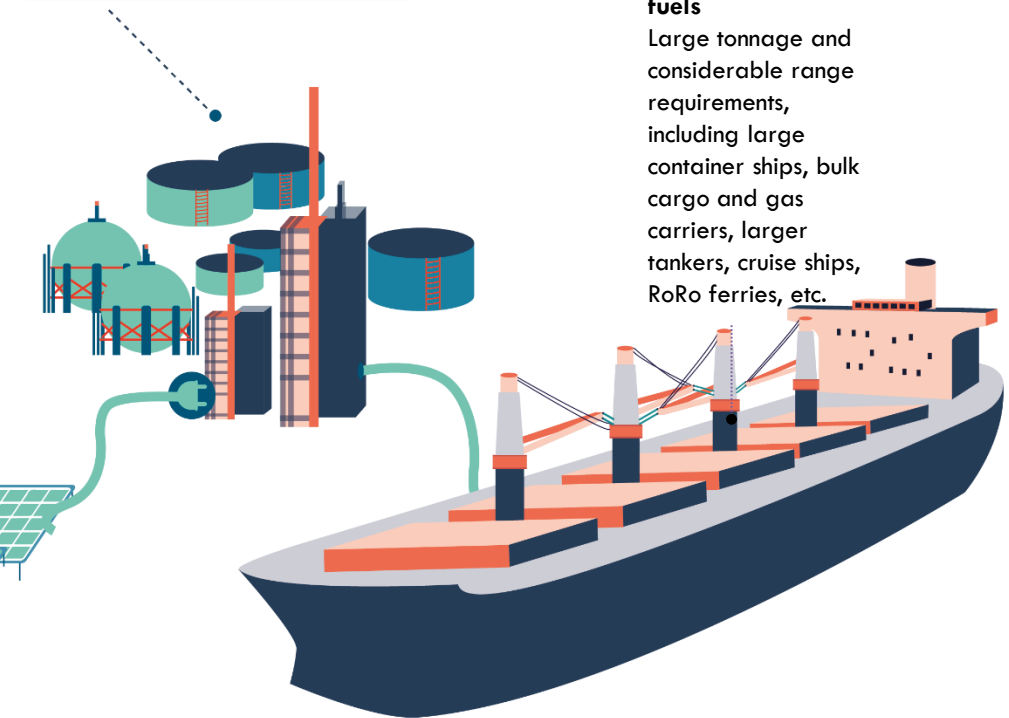
Relatively small tonnage and limited range requirements, including small cargo ships and tankers, barges, ferries.



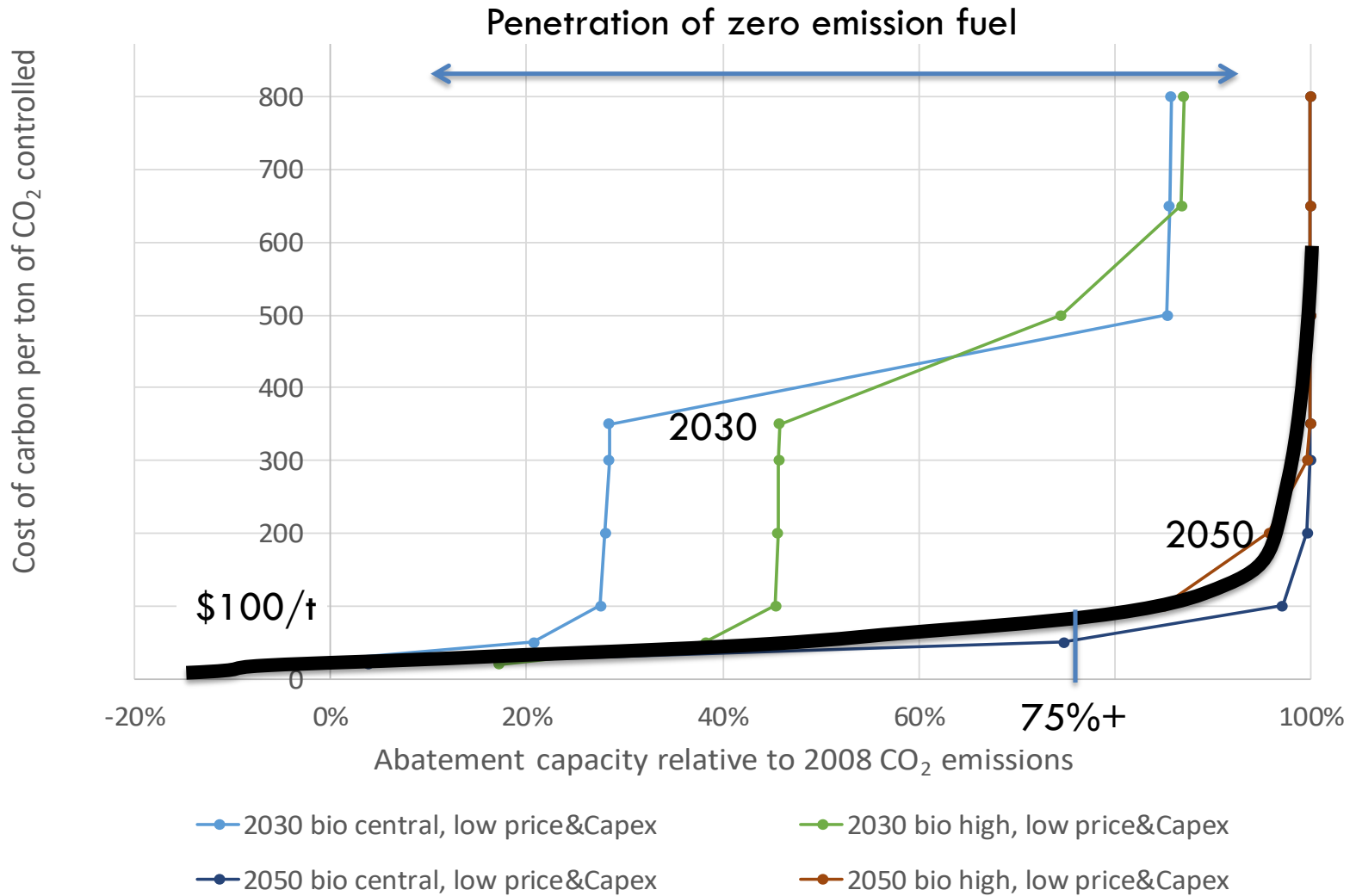
Electro-fuel production

**Deep-sea shipping requiring electro-fuels**

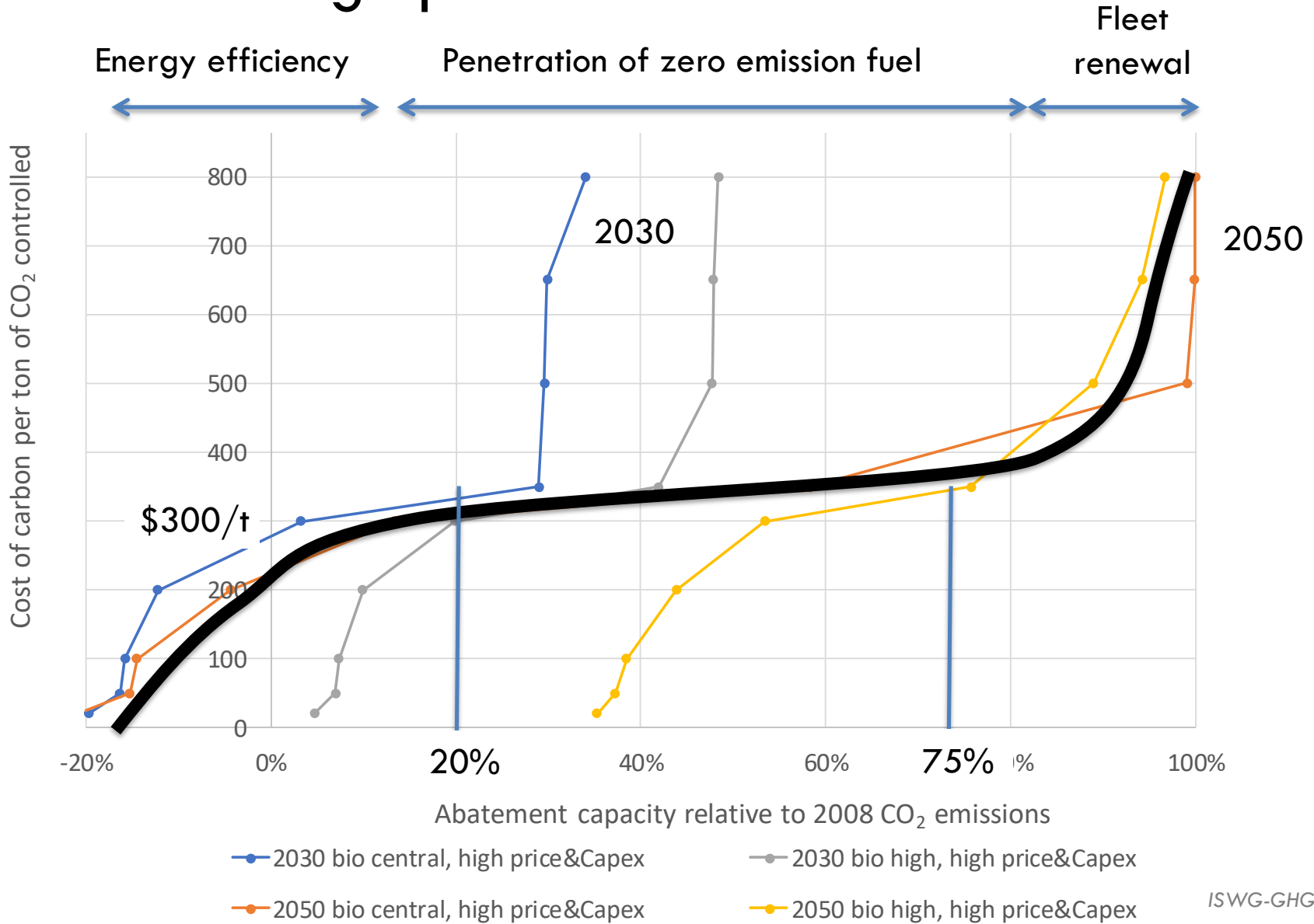
Large tonnage and considerable range requirements, including large container ships, bulk cargo and gas carriers, larger tankers, cruise ships, RoRo ferries, etc.



# Niedrige Energiepreise



# Hohe Energiepreise





## 50-100\$/t CO<sub>2</sub> by 2030

“..this Commission concludes that the explicit carbon-price level consistent with achieving the Paris temperature target is at least US\$40–80/tCO<sub>2</sub> by 2020 and US\$50–100/tCO<sub>2</sub> by 2030, provided a supportive policy environment is in place”

**Vielen Dank für Ihre Aufmerksamkeit!**

Für mehr Informationen oder bei Fragen:  
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