

FREMTIDENS **ENERGI**LØSNINGER FOR EFFEKTIVE FISKEBÅTER

TORE KALLEVÅG

AGENDA

HVOR ER VI IDAG?

EFFEKTIVE BÅTER NÅ
OG I NÆR FREMTID

MOT NULLUTSLIPP
OGSÅ I FISKERI?

HVA OM?

HVOR ER VI IDAG?

- Fra stor hovedmotor til hybrider, batteri, diesel elektrisk, 2-step gear
- Utslippsreguleringer

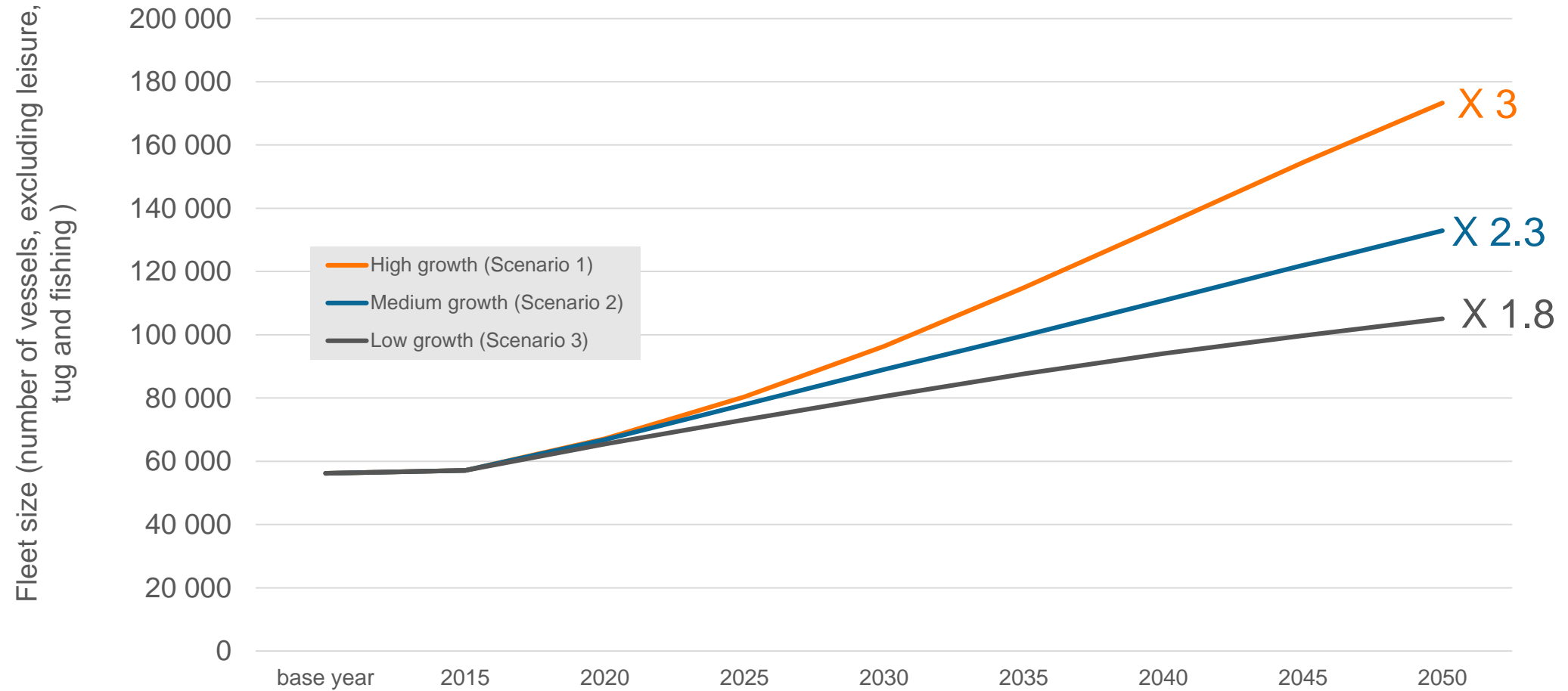
EUROPA - NORDISKE TRENDER/SITUASJON

- Lokalt marked med sterkt innovasjonsdriv
- Sterke finansielle instutisjoner interessert i shipping
- Høyt fokus på innovative og effektive operasjoner

- IMO – 50% reduksjon av utslipp innen 2050
 - Norge har et mål om 50% reduksjon innen 2030
- ‘World heritage target’ fjorder fossilfrie innen 2026
- Oslo krever utslippfrie skip fra 9nm innen 2025
- Sverige setter mål om reduksjoner på 30% innen 2030 – nøytralt innen 2050

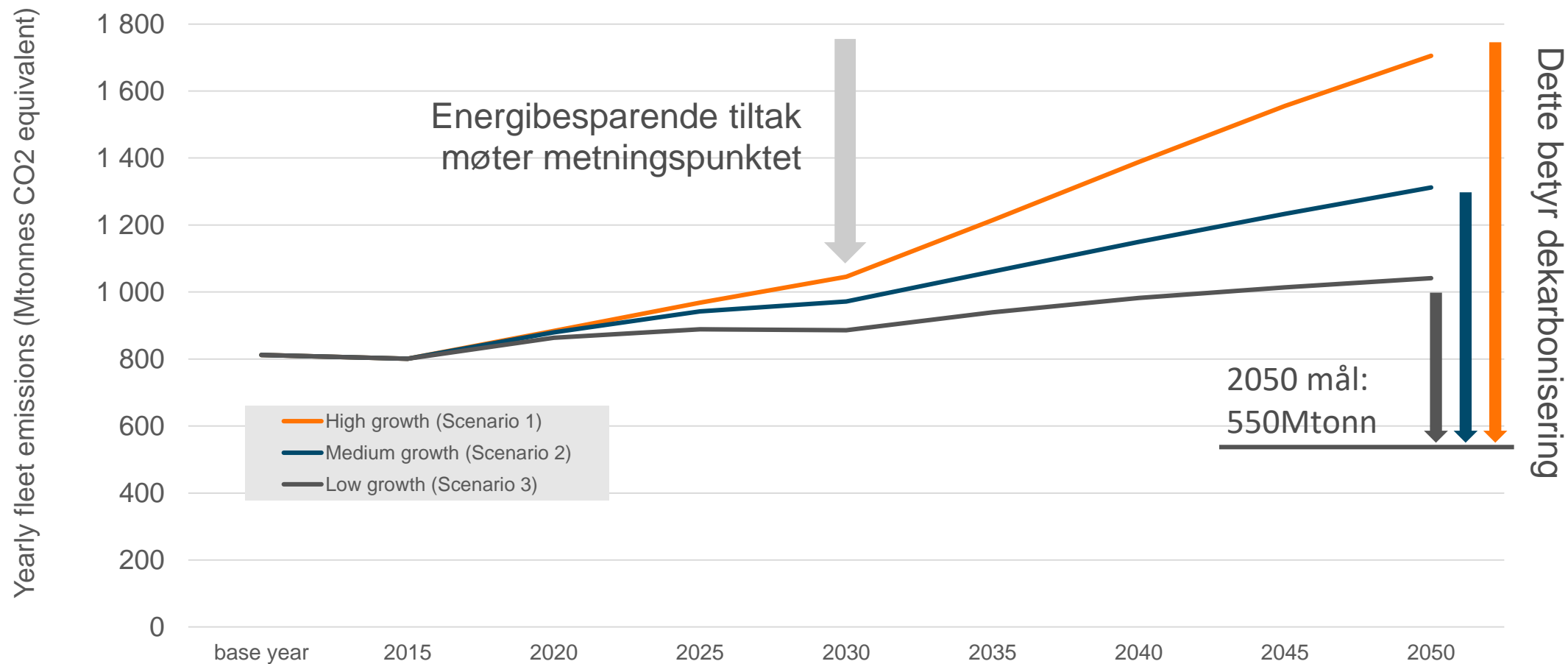
- Det vi får til i våre markeder vil sette standard for internasjonale reguleringer
- Utslippskrav fra havner vil også sette preg på reguleringene
- Miljøbevegelsen øker i styrke og folks oppfatning og krav vil øke også til shipping

DEN GLOBALE SKIPSFLÅTEN VIL ØKE



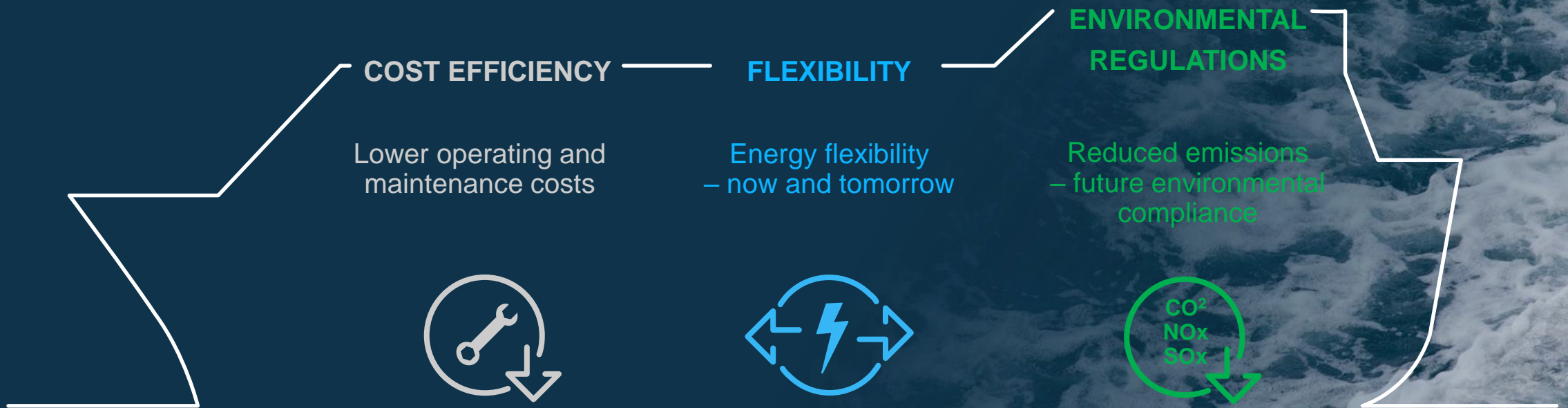
Source: In-house modeling based on CE-delft data as used by the IMO

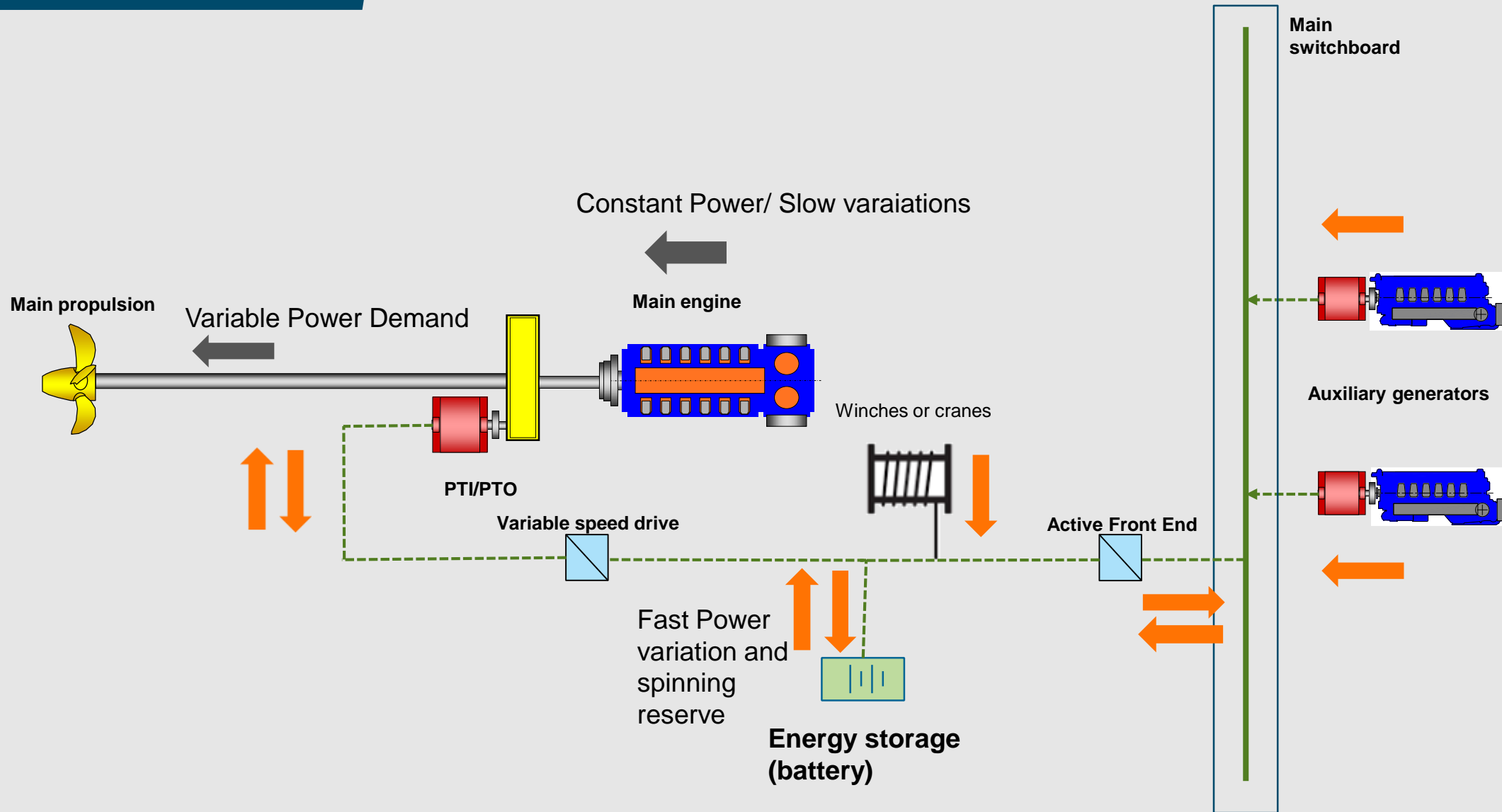
UTSLIPPENE VIL ØKE



Source: In-house modeling based on CE-delft data as used by the IMO

Hvorfor hybridanlegg?





EFFEKTIVE BÅTER NÅ OG I NÆR FREMTID

- Tradisjonelle fremdriftsløsninger utfordres (fra stor hovedmotor til hybrider, DE,)
- Alternative brennstoff



Salt design



Wärtsilä design



Wärtsilä design



Wärtsilä design

MOT NULLUTSLIPP OGSÅ I FISKERI?

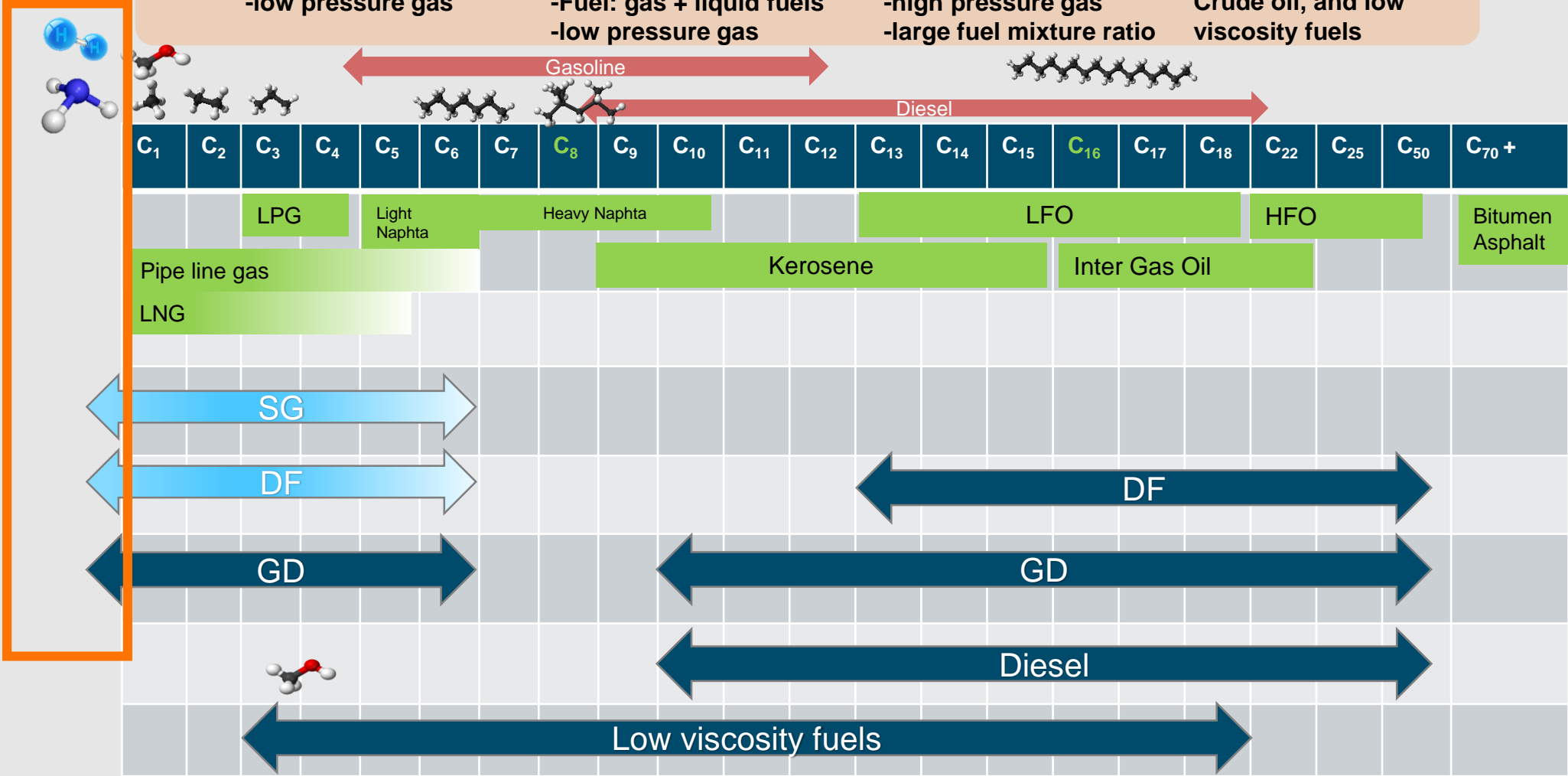
Fuel - Where to go?





Hydrocarbon variations in fuels

<p>SG = Spark Ignited -Otto process -Fuel: gas -low pressure gas</p>	<p>DF = Dual Fuel -Otto process + pilot -Diesel process -Fuel: gas + liquid fuels -low pressure gas</p>	<p>GD = Gas Diesel -Diesel process + pilot -Fuel: gas + liquid fuels -high pressure gas -large fuel mixture ratio</p>	<p>Diesel -Diesel process -Fuel: MDO, HFO, Crude oil, and low viscosity fuels</p>
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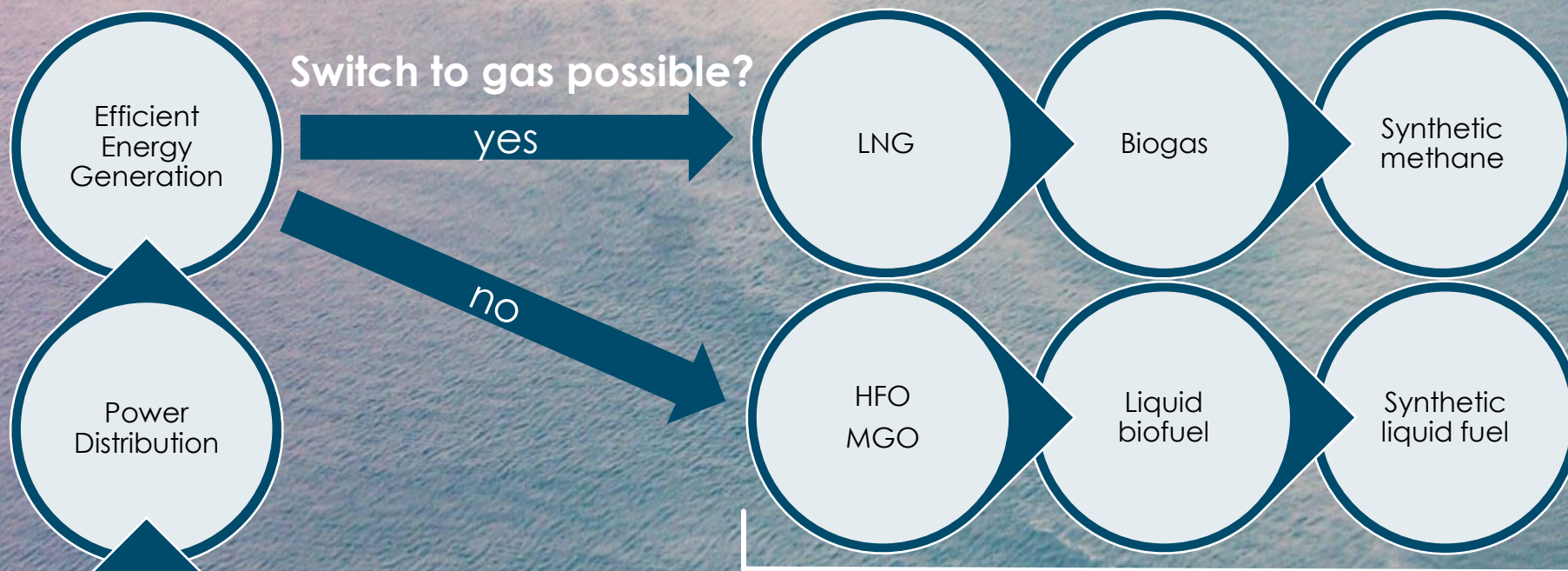


FUEL FLEXIBILITY



The vessel perspective

The fuel perspective



Compatible with today's ships, bunkering infra, safety experience and regulations. Key to fast market takeup. Methanol is the dark horse in this discussion. Easy to store, bunker and burn, it may leapfrog other fuels.

Notes:

- This pathway is valid for the bulk of the global shipping industry.
- In niches, other solutions may be more logical and profitable.
- Electrification of vessels will happen in segments where possible (IWW, short distance ferries, etc.)
- The advent of on-road electromobility will continue to drive down battery and possibly fuel cell prices.
- For longer haul applications, physics preclude the use of full battery electric ships.
- H2, ammonia seen to play a niche role for the coming 2 decades due to missing rules/regulations/experience
- Synthetic fuels are "hydrogen carriers"; built from green hydrogen and other elements to build a useable and practical fuel



FUEL ROADMAP

2020

2030

2050

Pros

Cons

Fossil LNG

Bio LNG

Synthetic LNG

*)

green Hydrogen

*)

green Ammonia

*)

green Methanol

*) Introduction year only indicative

- Cleanest fossil fuel, -5 to -20% GHG depending on engine type (well-to-wake) LNG infrastructure, rules and regulations exist, fuel is available
- Bio/syn GHG -70 to -100% depending on source (well to wake)
- Clear transition pathway as same infrastructure can be used for all

- No emissions
- Can be blended with LNG

- Only NOx emissions (=SCR)

- Carbon neutral, only NOx emissions

- Methane slip, must be reduced with on/off engine techs as novel combustion (e.g. HCCI, RCCI), Oxicat or Sandbed

- Massive investments in infra and challenges in handling the fuel (minus 253°C)

- Toxic, not available, no rules & regulations

- Toxic, not available yet

HVA OM....

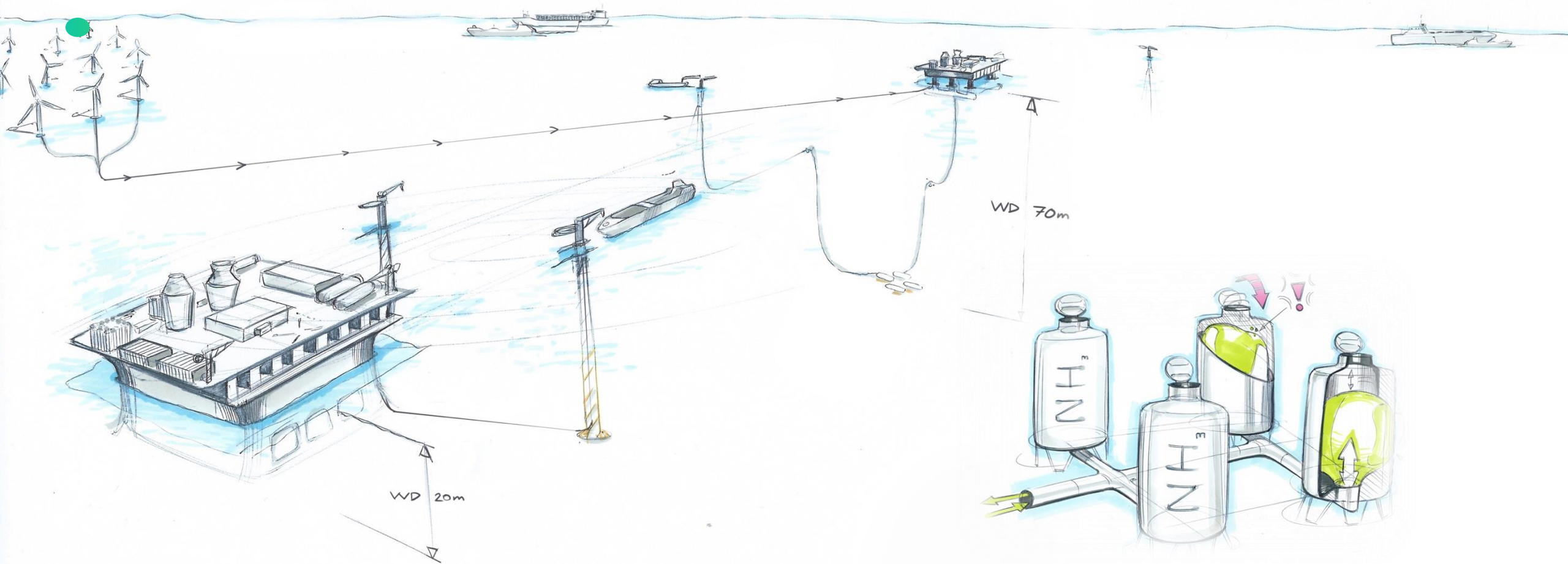
- ...vi våger å tenke annerledes..?
- ...båter får tilgang til fossilfri bunker til havs?
- ...mer prosessering skjer ut til havs på offshoreanlegg?
- ...et lasteskip som passerer tar med seg fisken videre til markedet?
- ...fiskebåtene deler et nullutslippskonsept med andre skipsnæringer?
- ...vi samarbeider med åpen innovasjon?



● ZEEEDS

● Zero
Emission
Energy
Distribution
at Sea

ZEEDS



TAKK FOR OPPMERKSOMHETEN 😊



WÄRTSILÄ