

Polish-Norwegian Seminar

Nor-Shipping, Oslo, April 5th 2022

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Head of Ocean Industries

Pioneering Green & Sustainable solutions – Green Shipping and Aquaculture in Norway

Innovation Norway contributes to sustainable growth and exports for Norwegian businesses

- The Government's main instrument for releasing value-creating industrial and commercial development throughout the country
- Aims to stimulate commercially and socio-economically profitable business development, and release the commercial potential of the regions
- Sparring partner for enterprises with ambitions throughout the country
- We work with those who believe they can change the world

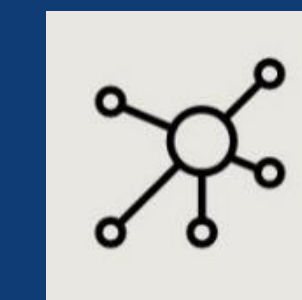
We offer:



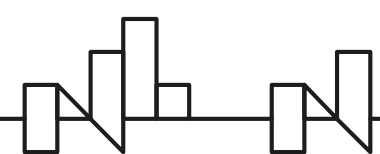
Capital



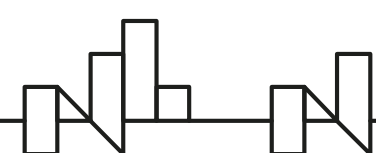
Expertise



Networks



Presence in all Norwegian counties and in 19 countries

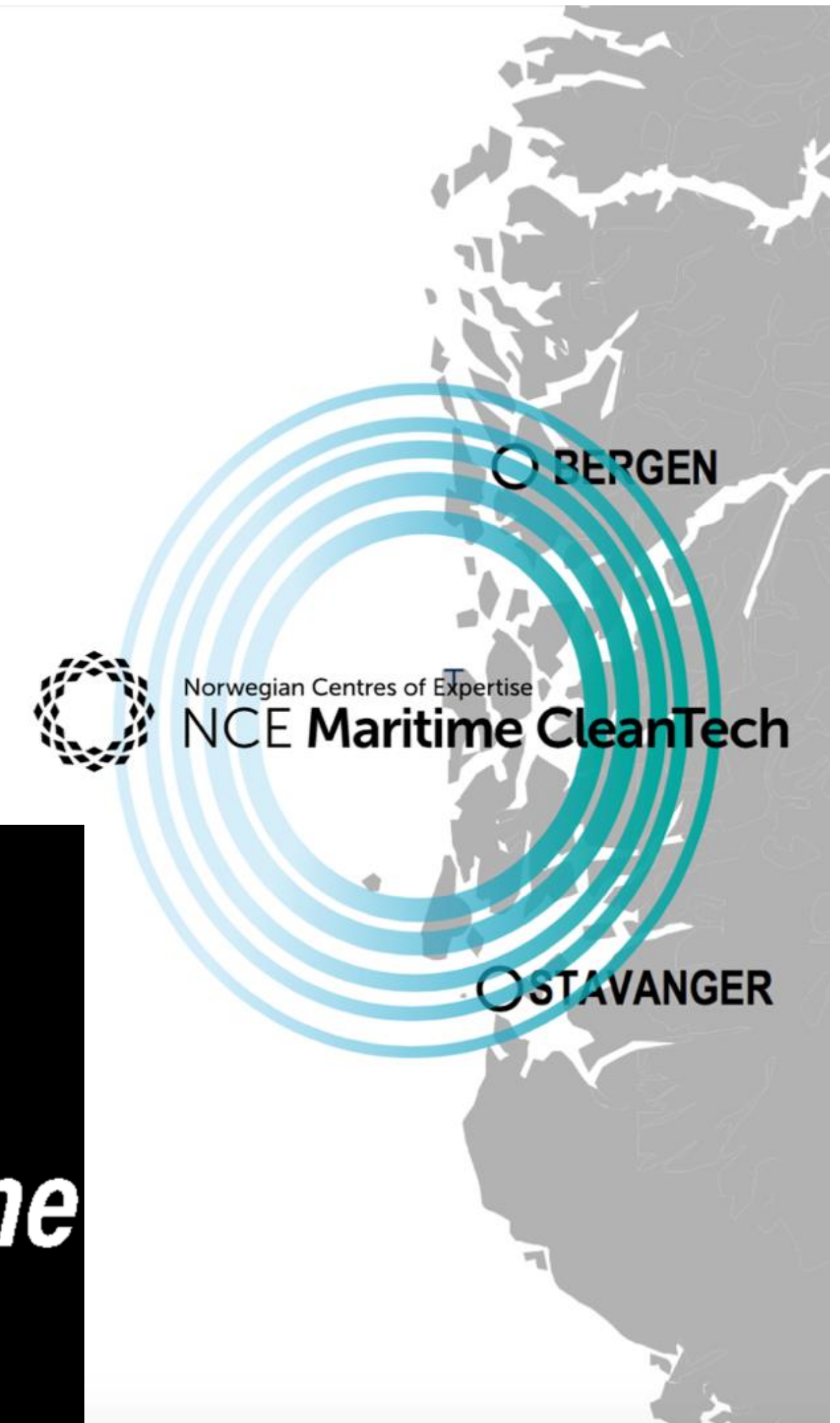


A complete maritime cluster – covering the whole value chain



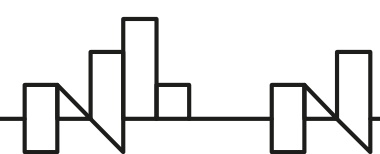
**BLUE
MARITIME
CLUSTER**

GLOBAL CENTRE OF EXPERTISE
NORWAY



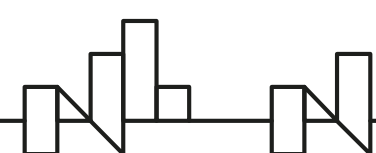
Norwegian Green Shipping in a nutshell

- Strict regulations on GHG emissions = market opportunities
- The Norwegian Shipowners Association's goals:
 - ✓ Cut GHG emissions by 50% by 2030
 - ✓ Only vessels with ZE technology will be ordered from 2030
 - ✓ A climate neutral fleet from 2050
 - ✓ Strive for an international ban from 2050 on fuel that is not climate neutral
- In the forefront of prototyping, not as good at scaling
- Emission-free solutions is the common denominator for Norwegian stakeholders
- Diversification - development of Z-E/ low-emission vessels for needs within various market segments
- Emphasis made on
 - ✓ Domestic fabrication of batteries and fuel-cells
 - ✓ Construction of infrastructure hubs along the coast



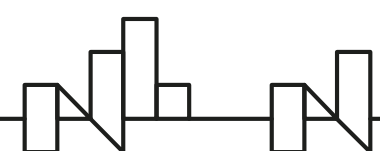
The value of trust

- Close collaboration - authorities, business and R&D institutions
- Authorities play a key role in facilitating the green shift
- Proactive attitude with regards to conversion to ZE solutions
- Proactive use of public tenders propelling green innovations
- Implementation of standards & regulations in close contact with the industry
- Driving piloting and testing of innovative solutions
- 4 test areas opened for autonomous ships and operations



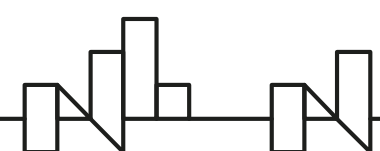
The green shift in the Norwegian ferry market - success criteria & pre-requisites

- Involvement and commitment from authorities regarding ambitions and direction of development
- Funding reflecting ambition level
- Competent and effective procurement organization securing cost-effective ferry services
- Dialogue with the market
- Joint effort from the public procurers
 - ✓ Creating critical mass
- Consistent and predictable requirements
- Market development
 - ✓ Measures securing long-term development
 - ✓ Individual tenders – assessment of economic risk on the ferry companies and predictable conditions



Trends and developments

- Shipowners choose to reduce risk by investing into low-emission solutions readymade for retrofit to 100% ZE in future
- Short sea cargo owners taking proactive roles and collaborating across business sectors to optimize zero-emission cargo logistics systems
- The governments is supporting the development of zero-emission infrastructure Hubs along the coast
- Implementation of enabling digital and AI solutions (Digital Twins etc.) to optimize fuels consumption, emissions, navigation
- NextGen ammonia engines under development
- Innovative/ forefront design solutions reducing fuel consumption (incl. rotor sails)
- Innovative, holistic autonomous solutions



Norway – pioneering sustainable maritime solutions

2000: The World's first
LNG-powered ferry
"Glutra"



2015: The World's first
battery-hybrid fishing
boat "Karoline"



2003: The World's first
LNG-powered offshore
vessel
"Viking Energy"



2019: The World's
largest hybrid
passenger ferry "Color
Hybrid"



2015: The World's first
fully battery-electric
ferry "Ampere"



Norway – pioneering sustainable maritime solutions

2022: The World’s first hydrogen-electric ferry “Hydra”



2022: The World’s first fully autonomous container ship “Yara Birkeland”



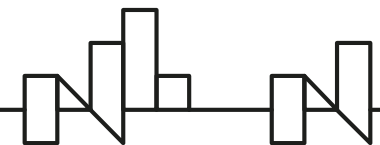
2023/2024: The World’s first hydrogen-electric work boat for the aquaculture industry



2024 (est.): The World’s first carbon-free ammonia-fueled (modified) supply vessel “Viking Energy”



2024: The World’s first hydrogen-powered bulk ship “With Orca”

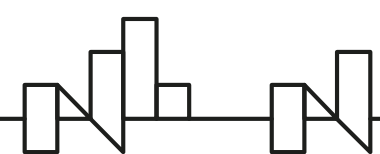


100% electric sightseeing vessel “Future of the Fjords”

- Set in operation in May 2018
- “Vision of the Fjords” sister
- Built by ship builder Brødrene Aa
- 100% battery-electric
- Built using light-weight carbon-fiber composite materials to reduce energy consumption
- The advanced charging station is capable of charging the batteries with approximately 800kWh of power during the 20 min docking period
- The propulsion system enables a cruise speed of 16 knots



Foto: Tor Johan Pedersen





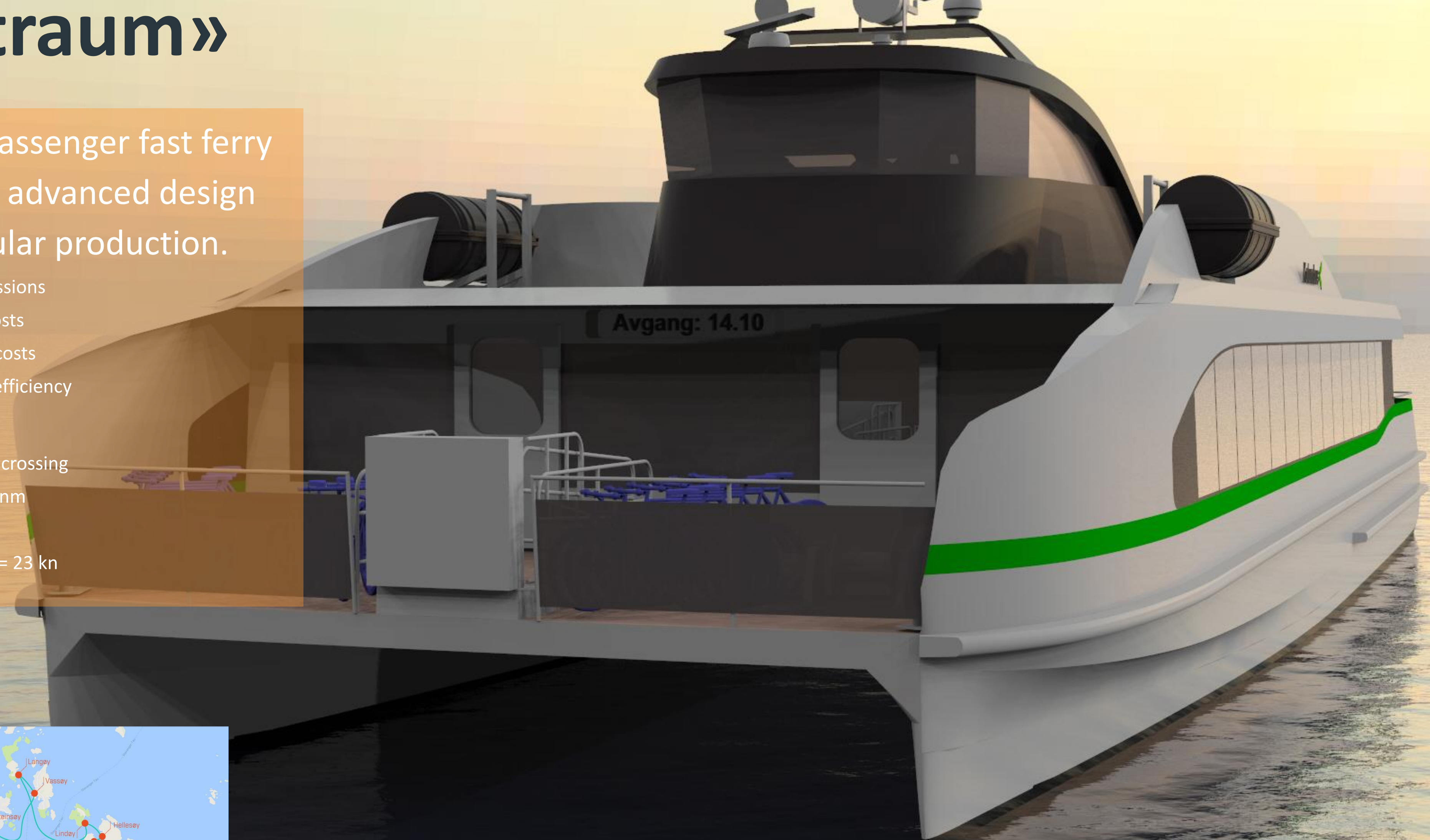
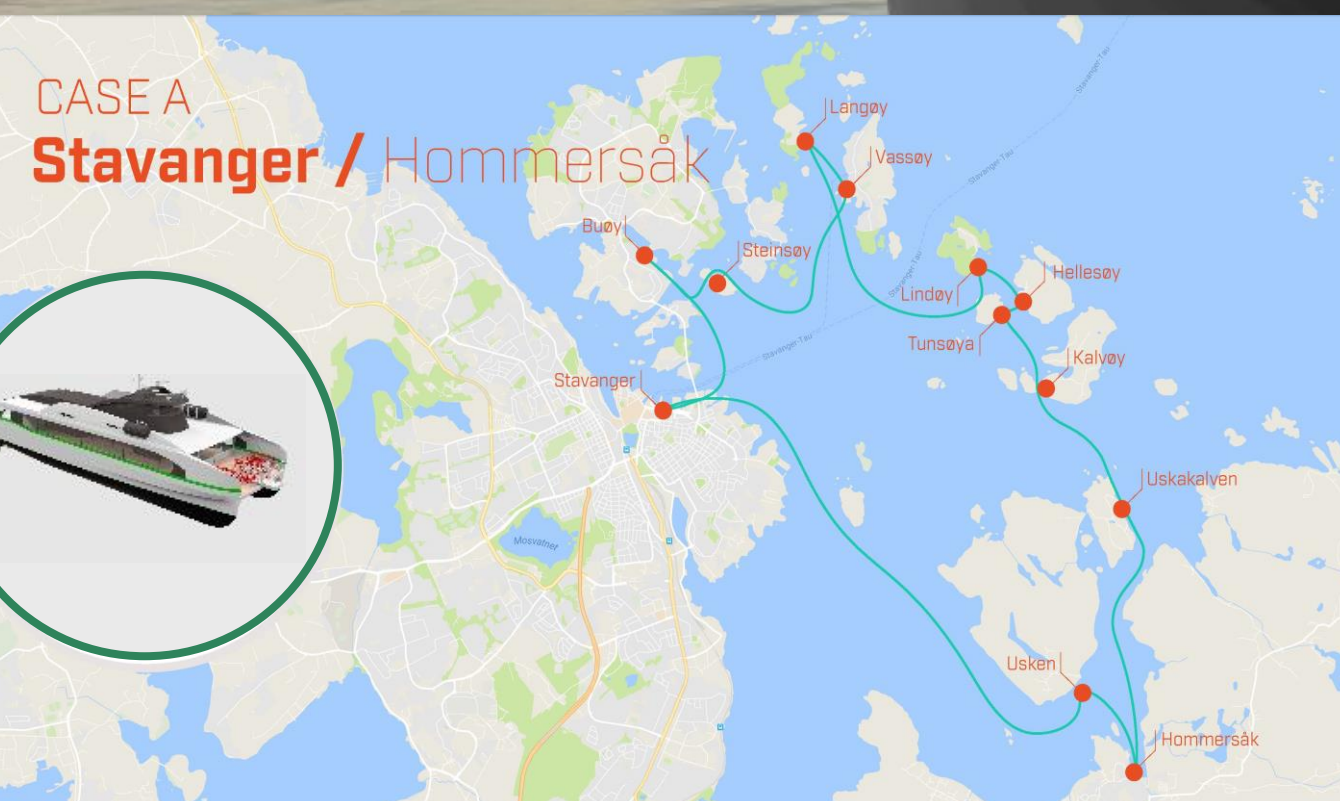
«Medstraum»

A fully electric ZE passenger fast ferry developed through advanced design methods and modular production.

- Zero GHG and noise emissions
- 25% lower production costs
- 70 % lower engineering costs
- Superior hydrodynamic efficiency

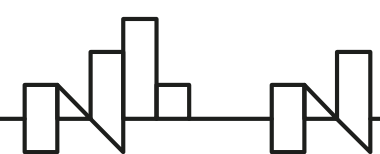
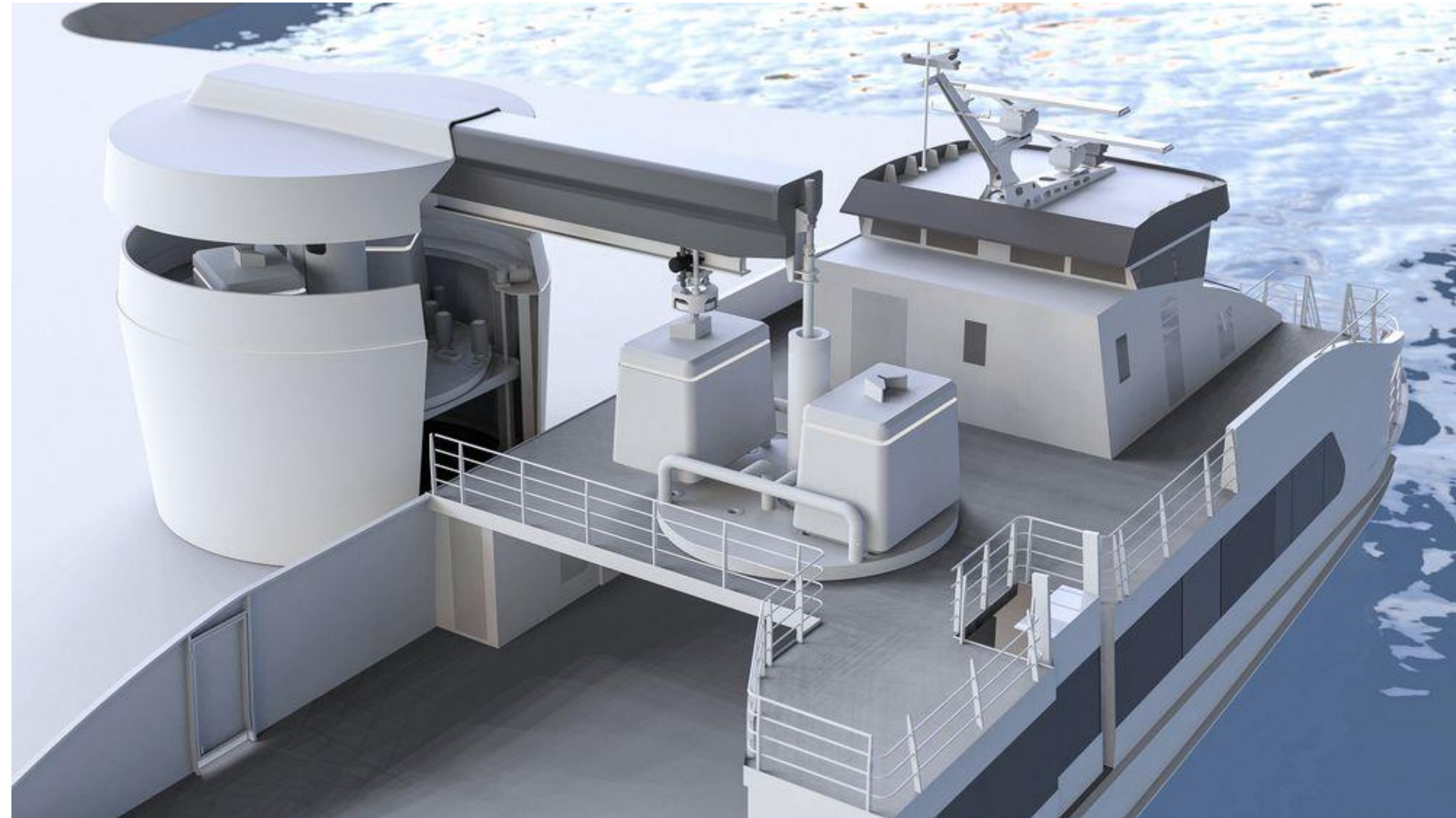
General Data:

- Hommersåk/City Islands crossing
- Route length: 10,5 - 22,3nm
- 15 crossings per day
- Minimum service speed = 23 kn
- Capacity:
 - 147 passengers
 - 20 bicycles



Robotized battery replacement makes speedboats emission-free

Norled vil sail speedboats up to 35 knots with batteries. An automated system with robot for rapid battery replacement makes it possible to sail both rapidly and far. Replacement of 2 battery packs (2 MWh each) will be completed in just 3 min. while passengers disembark/ embark. Pilot testing to be launched during spring 2022.

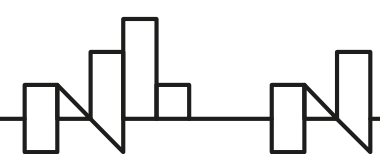






Emission-free, autonomous cargo/container solutions

- New, innovative, holistic green logistics solutions
- Cargo owner taking the initiative



Maritime projects supported by EU funding

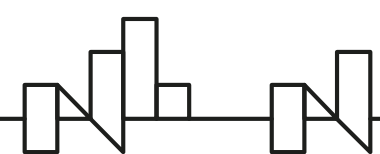
Viking Energy

[The world's first carbon-free ammonia-fuelled supply vessel on the drawing board - equinor.com](https://www.equinor.com)



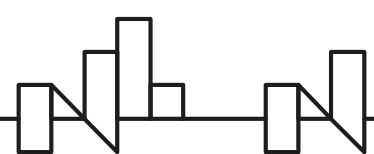
Topeka

[HySHIP project clinches EUR 8m funding award – NCE Maritime CleanTech](#)



Ammonia freight ship – fueled by ... ammonia

- Project owner: Grieg Edge AS
- Project partner: Wärtsilä Norway AS
- The ship will carry both green ammonia to end-users and in parallel utilize green ammonia as fuel
- Develop and demonstrate ammonia-driven combustion engine
- Innovative solution for ship-to-ship bunkering of ammonia
- Fuel-effective ships design

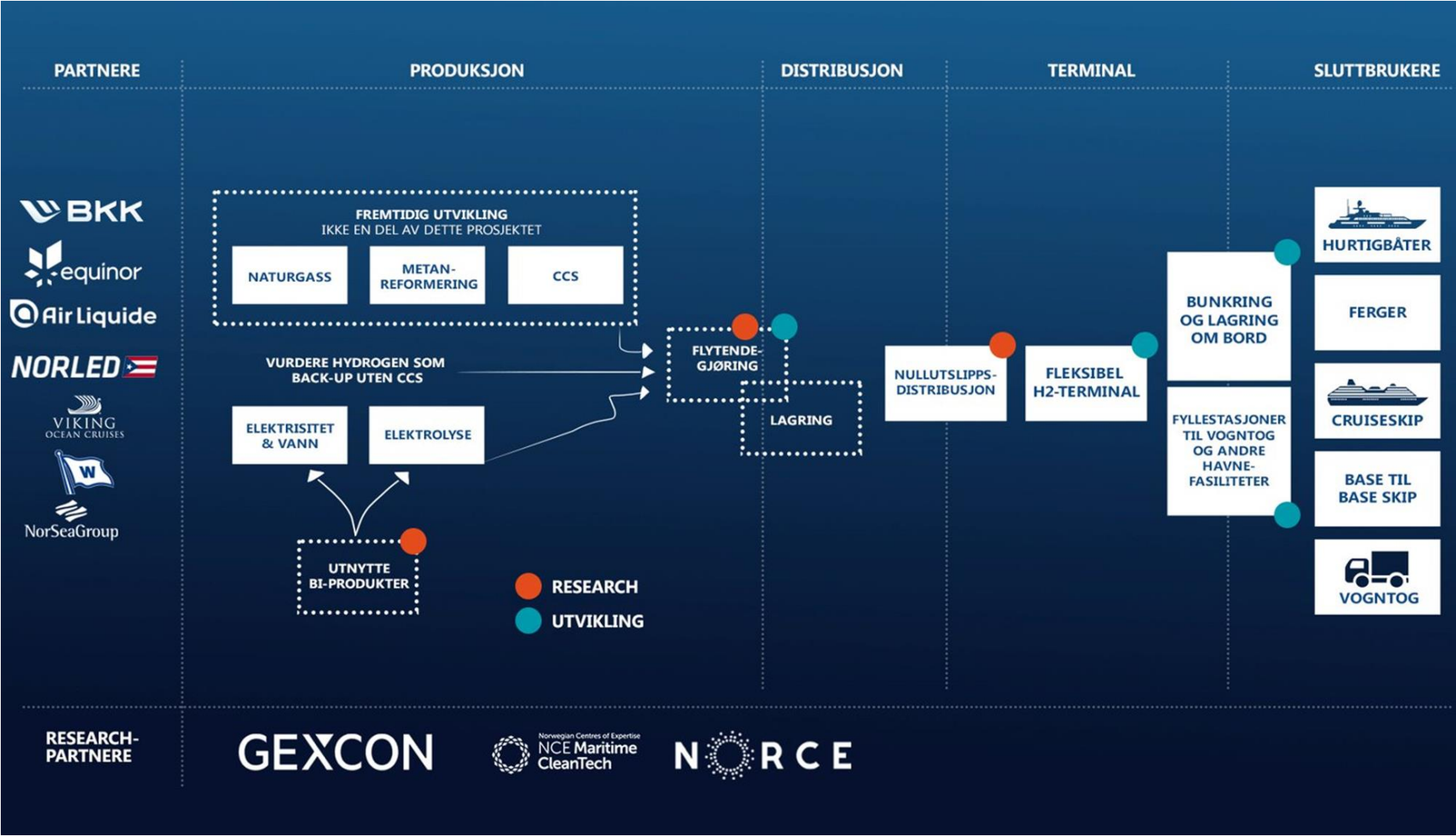


The Port of Narvik in northern Norway needs a new workboat which should be both fast and emissions-free. They will now develop one of the world's first hydrogen-powered high-speed vessels, which will be equipped with fuel cells from TECO 2030, together with the following partners:

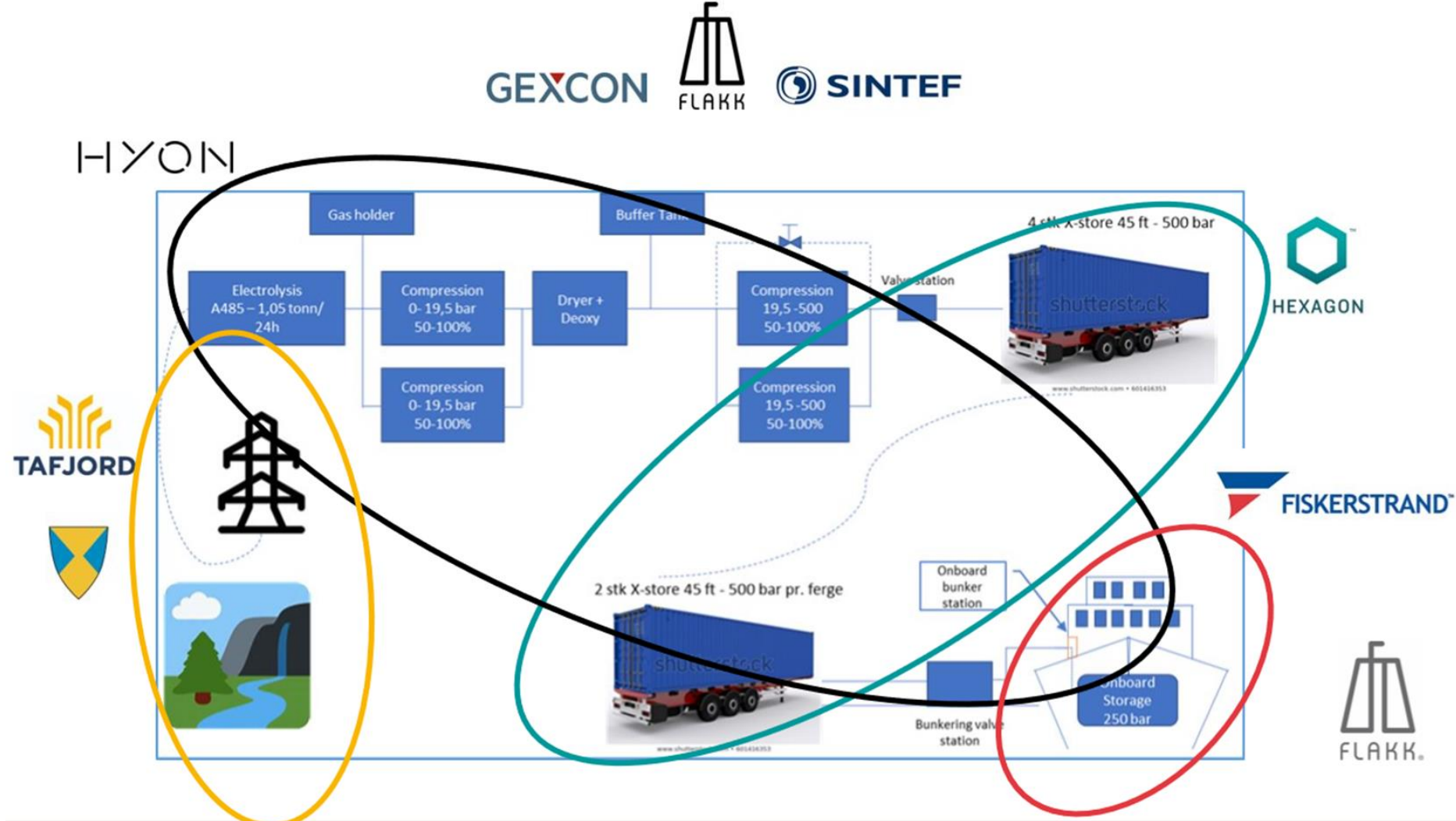


Hydrogen and Ammonia Infrastructure projects .. some examples

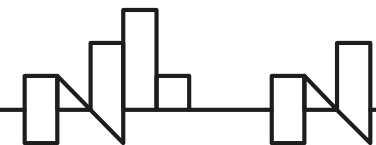
Complete infrastructure of liquefied H2 for the maritime industry



Hellesylt Hydrogen Hub: pressurized H2 infrastructure for maritime use



Azane Fuel Solutions – developing the world’s 1st value chain for ammonia bunkering infrastructure for the maritime sector



Norwegian seafood industry

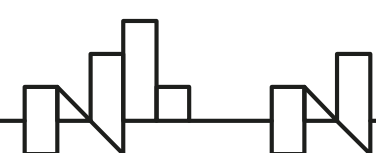
120,8 billion NOK

Norway's total export income from Norwegian seafood

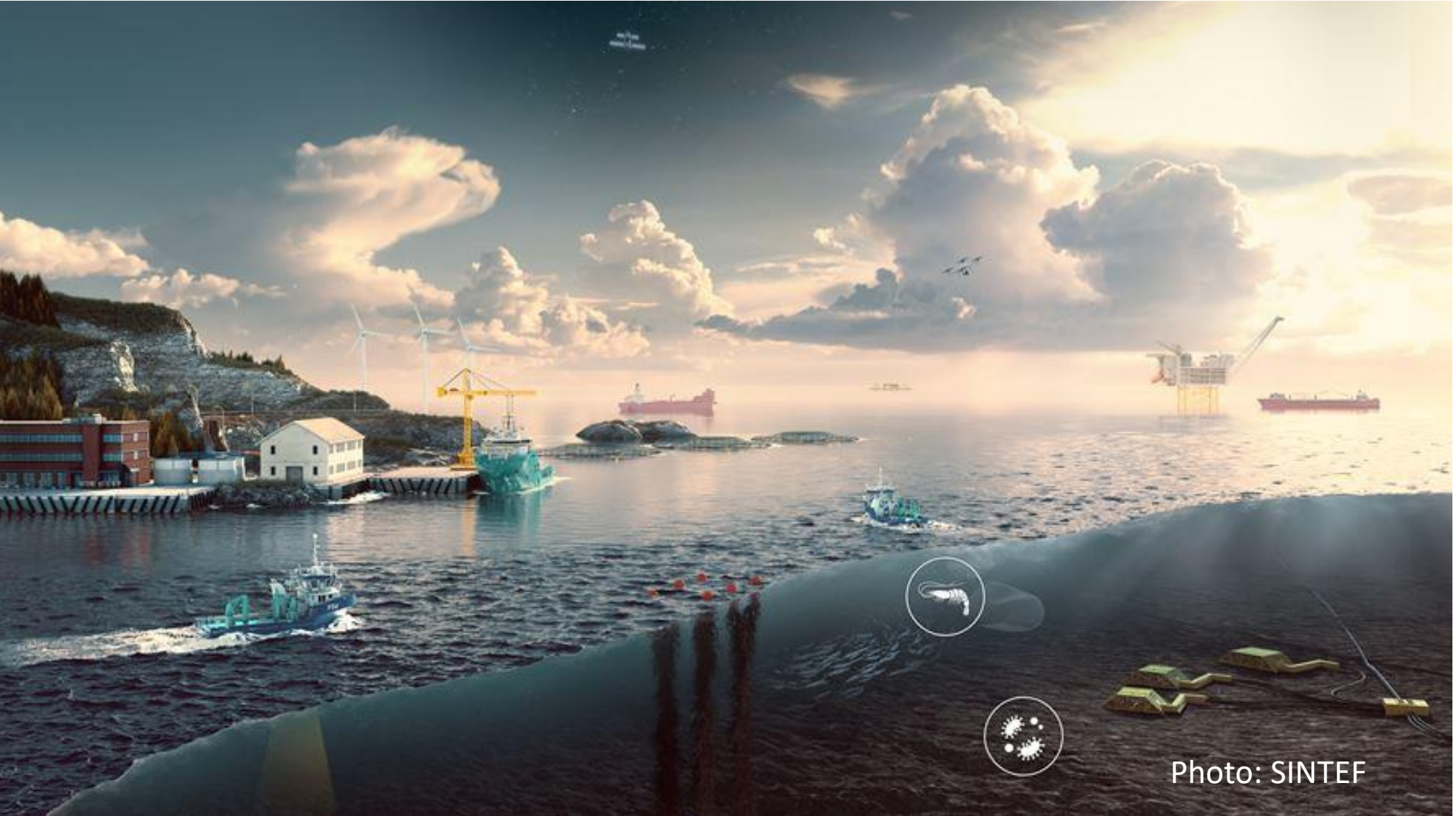
70% Salmon

1,84 billion NOK

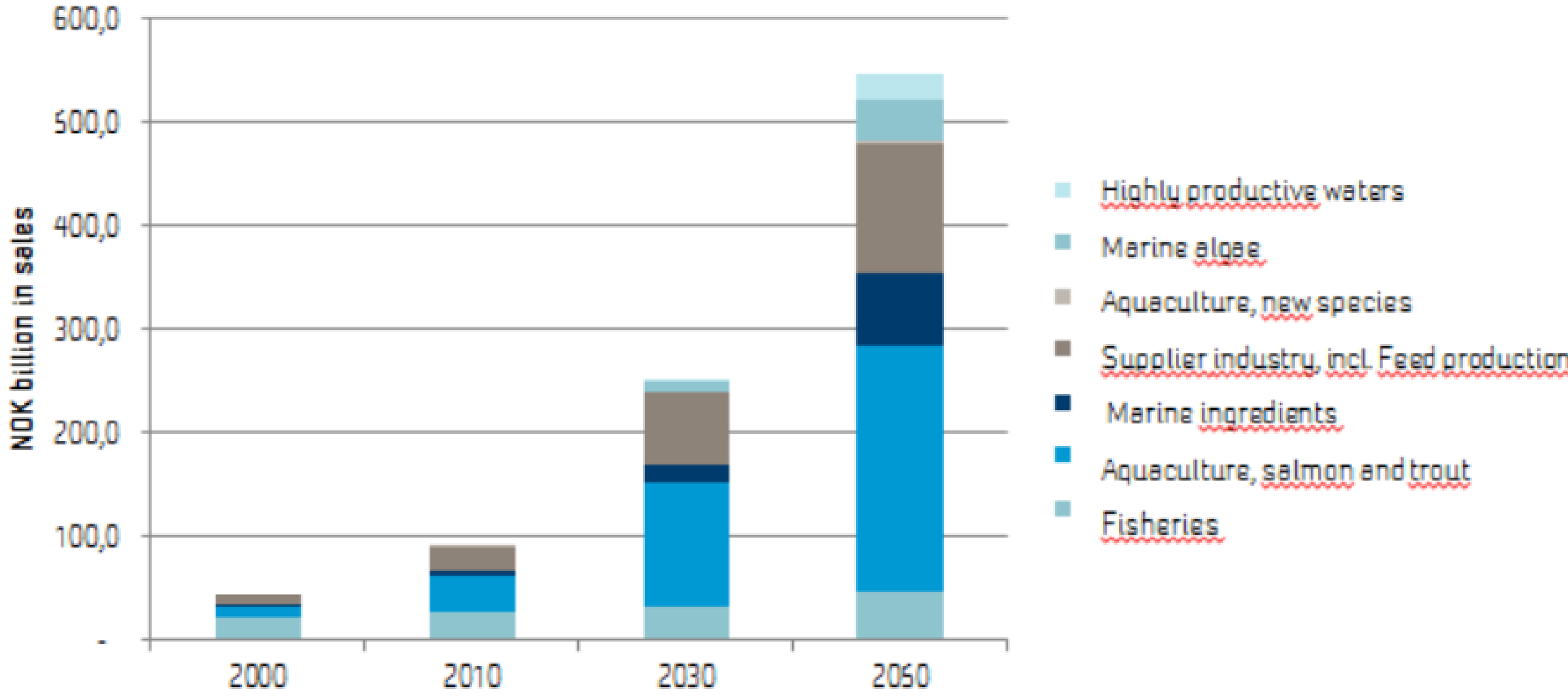
Export to Poland in 2021 (48 870 MT)



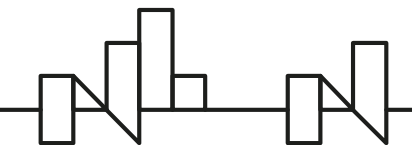
Norwegian Ambitions - Blue Economy



Scenario 2050: value generation potential in the marine sector



Source: NTVA and DKNVS



Landbased



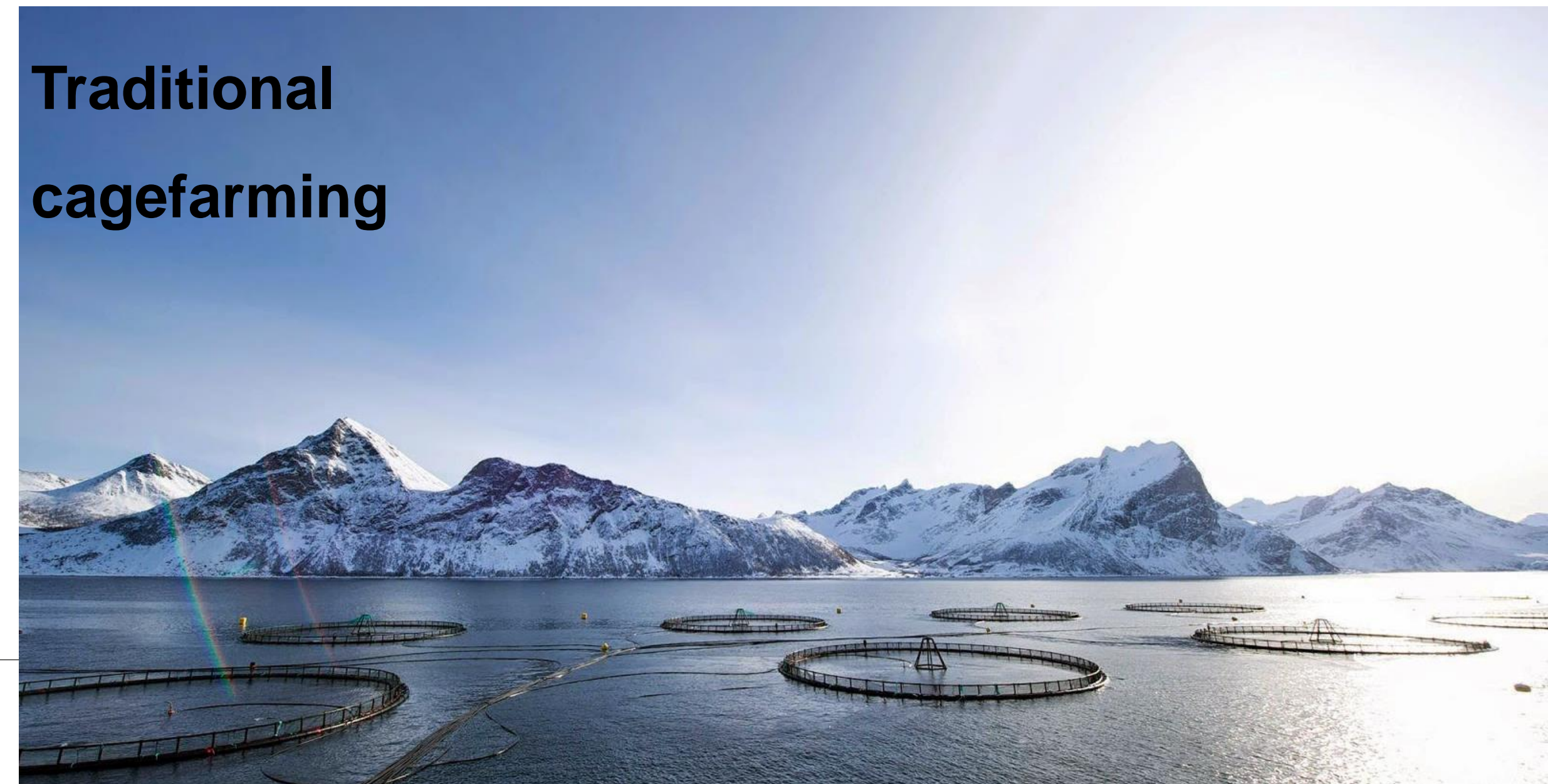
**Closed / semiclosed
in sea**



**Exposed
aquaculture**



**Traditional
cagefarming**



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