

# Grønt skifte i blå næring

NCE Maritime CleanTech  
CEO, Hege Økland



Norwegian Centres of Expertise

**NCE Maritime CleanTech**

# Important milestones



Arena-status



Miljøprisen 2015

Short Sea Pioneer



INDIA 2017



EU-ADVISOR



CHINA BUSINESS SUMMIT



2011

2013

2015

2017

2019

2021

2012

2014

2016

2018

2020



MF «Folgefonn»



URBAN WATER SHUTLE



Norwegian Centres of Expertise



DIP Havbruk



TFAM



SHIPFC



Sivaprisen 2016



Vancouver and Seattle

2010: CLUSTER PRE-PROJECT STEERING GROUP ESTABLISHED





**YARDS**



**SHIP OWNERS**



Norwegian Centres of Expertise  
**NCE Maritime CleanTech**

**GOLD** Cluster Management Excellence  
 PROVEN FOR CLUSTER EXCELLENCE

17 PARTNERSHIPS FOR THE GOALS

**ENERGY COMPANIES**



**PORT**



**R&D AND EDUCATION**



**PUBLIC SECTOR**

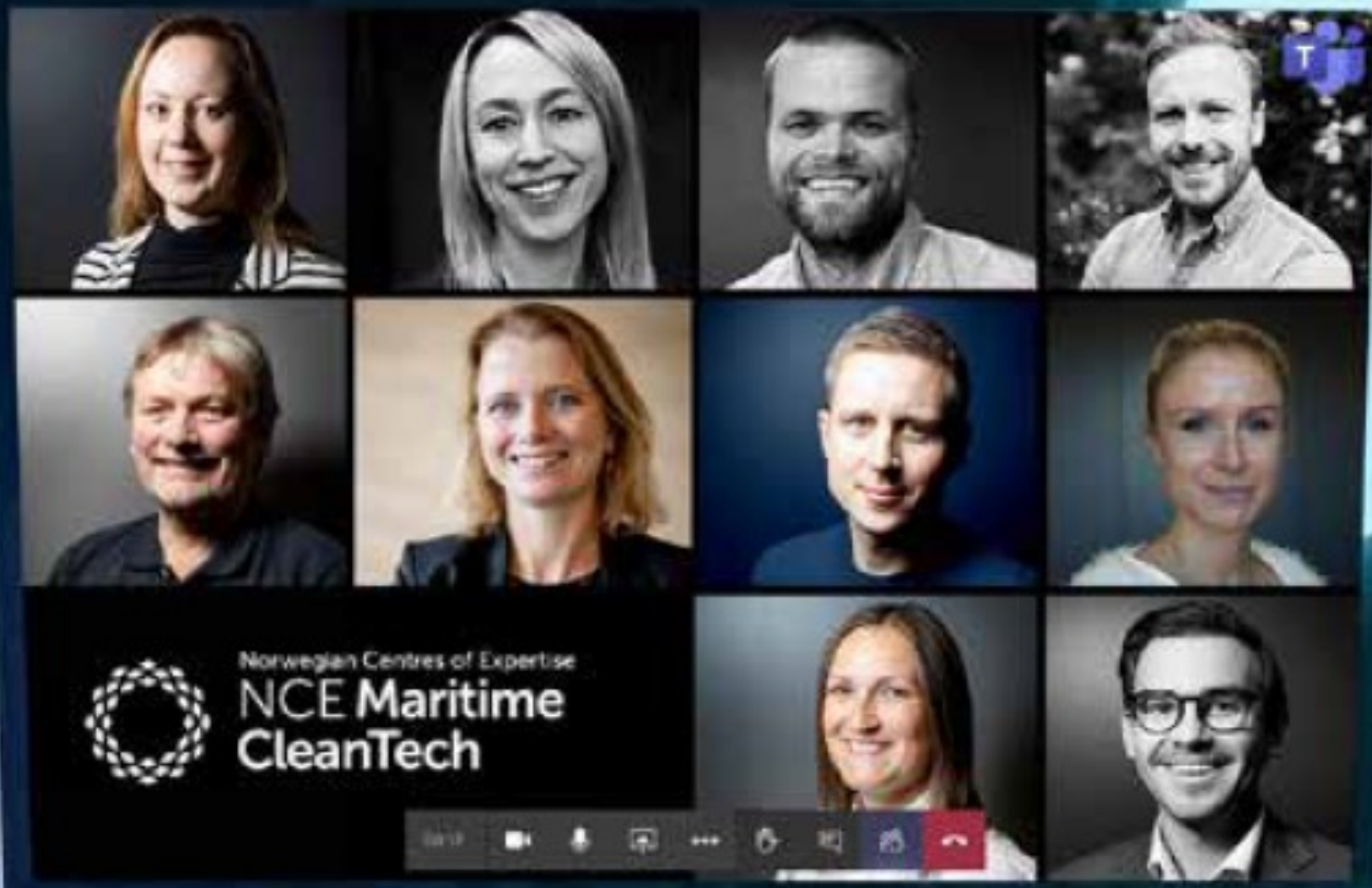


**CLASS SOCIETY - REGULATORS**

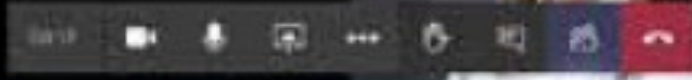


**FINANCE & LAW**





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CleanTech**



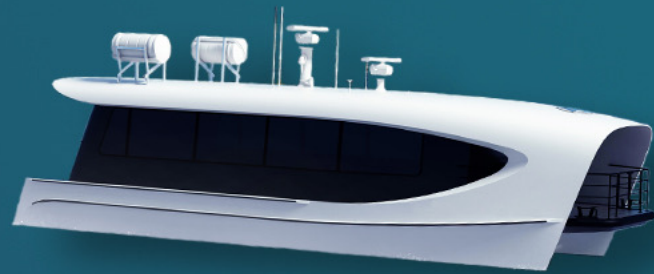




CARGO VESSELS



PASSENGER TRANSPORT



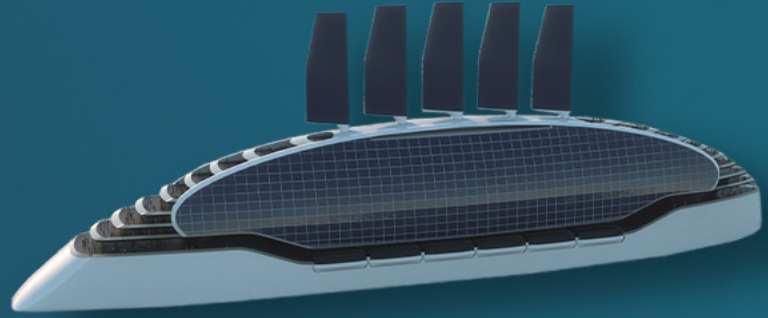
AUTONOMOUS VESSELS

# Innovation

projects in the cluster



FERRIES



CRUISE SHIPS



OFFSHORE VESSELS

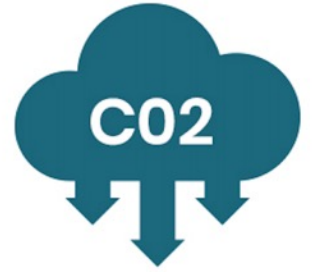


FISHFARMING VESSELS

BACKGROUND

# The regulatory landscape

Governed by banks, regional initiatives, local regulations, IMO and their 2018 GHG Strategy.



2023

**-20%**

Existing ships will need to reduce consumption per transport work by 20% compared to 2008.

2030

**-40%**

Shipping sector to reduce emissions per transport work by 40% compared to 2008.

2050

**-70-90%**

Shipping sector to reduce total emissions by 50% compared to 2008. Carbon intensity therefore need to improve around 70-90% = zero emission.





Port of  
Bergen

# Environmental Port Index (EPI)

The ship's  
footprint while  
in port

12 Norwegian  
cruise ports

DNVGL as  
independent  
3rd part

Profile +  
Departure  
report

# Zero emission in the Norwegian Fjords

26<sup>th</sup> April 2018:

*“The Norwegian Parliament asks the government to implement requirements for zero emission from cruise ships and ferries in the west Norwegian fjords on the World Heritage List, when it is technically possible and by 2026 at the latest”.*







POSEIDON  
PRINCIPLES

# A global framework for responsible ship finance

The Poseidon Principles provide a framework  
for integrating climate considerations into lending decisions  
to promote international shipping's decarbonization



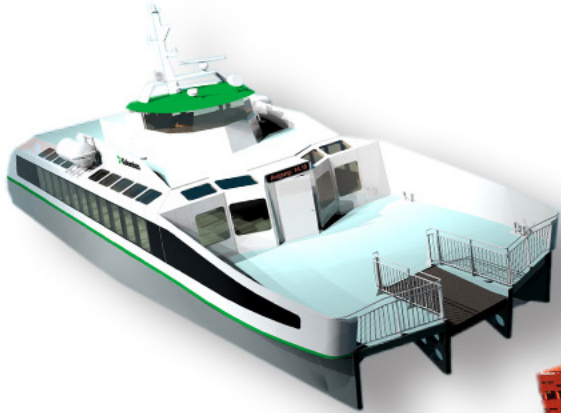


# EU PROJECTS

**TFAM**  
Transport Advanced and Modular



World first zero emission fast ferry



**SHIPFC**  
GREEN AMMONIA ENERGY SYSTEM



World's first high-power ammonia fuel cell on a vessel.



**FLAGSHIPS**



Two commercially operated hydrogen fuel cell vessels.



**HyShip**



Ro-ro vessel on liquid H2, and viable H2 supply chain



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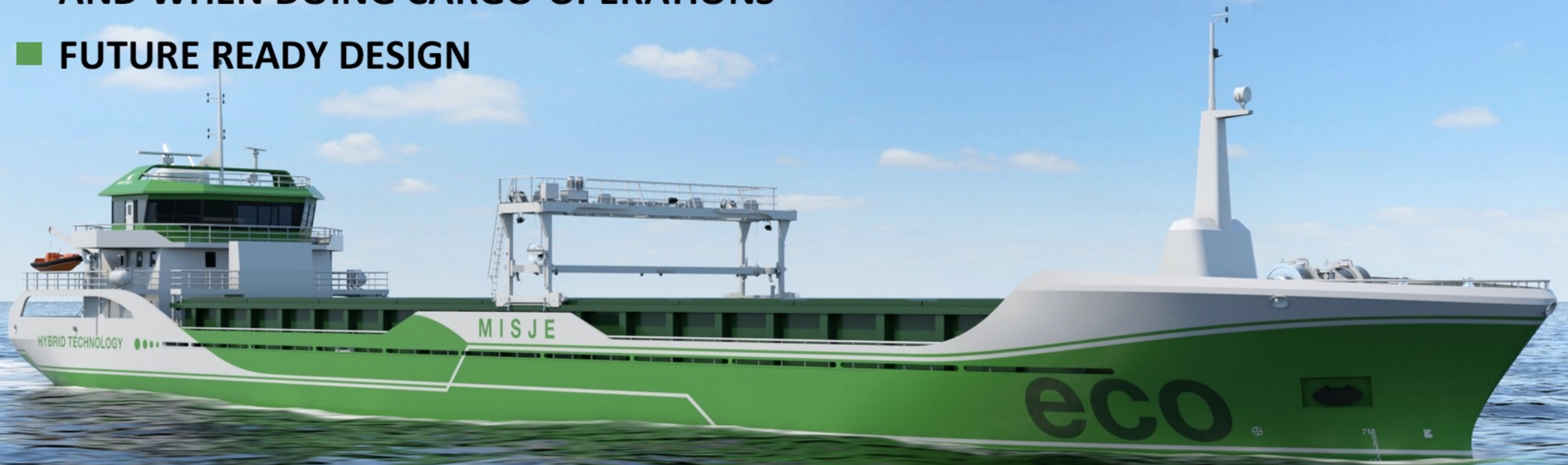
# Hybrid solutions

REDUCING EMISSIONS FROM DRY BULK



*Misje Rederi AS*

- 5000 DWT BULKERS
- BATTERY HYBRID PROPULSION
- EMISSION FREE IN AND OUT OF PORTS AND WHEN DOING CARGO-OPERATIONS
- FUTURE READY DESIGN





# Fuel Cell Project

Significant emission reductions at sea, with zero emission capability. Patented solution currently under construction, with Odfjell representing the project group as the only ship owner. The fuel cell will be installed and piloted on an Odfjell ship after 2022.

## Features & Mechanisms

- CHEOP/CMP: Clean, highly efficient offshore power
- Solide oxide fuel cell (SFOC), with fuel-flex capability
- FC to be installed as a 1200 kW aux engine onboard one of the newest vessels over the next years.

## Conservative Emission Reductions (on LNG):

35 % fuel oil consumption

45 % CO<sub>2</sub> emissions

90 % Sox emissions

80 % NO<sub>x</sub> emissions

On Ammonia, CO<sub>2</sub> emissions will be **zero**





# Satser 400 millioner på hydrogen i Bergen: – Det var Toyota som kom til oss

Batterifabrikken Corvus skal samarbeide med Toyota om maritime brenselceller. Det kan bety 200 nye arbeidsplasser i fabrikken på Midttun fra 2024.



Satsingen ble koronasikkert lansert i et studio i Grieghallen ledet av Hege Økland fra NCE Maritime CleanTech, som her intervjuer Geir Bjørkeli.

Geir Martin Strande



# “Norges neste industrieventyr”

# PILOT-E

Raskere fra idé til marked



 BKK

 equinor

 AirLiquide

 NORLEDE

 WILH. WILHELMSSEN

 VIKING  
CRUISES  
*Exploring the World in Comfort\**

 NorSeaGroup

 Norwegian Centres of Expertise  
NCE Maritime  
CleanTech

 NORCE



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