



# The next generation of marine fuel cell systems

*09.11.2021 - Bergen Energy Lab Lunch Webinar*

SVP Product Architecture – Fuel Cells

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# The Company



## Supplier of ESS

- Founded in 2009
- HQ in Norway
- Multiple production sites
- Global sales and service network
- 180+ employees



## The team

- Superior battery knowledge
- Building Fuel Cell knowledge
- Culture for innovation
- Strong maritime DNA
- Entrepreneurial skills
- Extensive R&D department



## Ownership

- Privately held ownership
- Strong industrial owners
- Investors in clean energy
- Active support to growth
- Long term focus



# STRONG CONSORTIUM

– Innovation through collaboration



10M+ USD Budget

TOYOTA



Corvus Energy



NORLED

LSN

Wilhelmsen

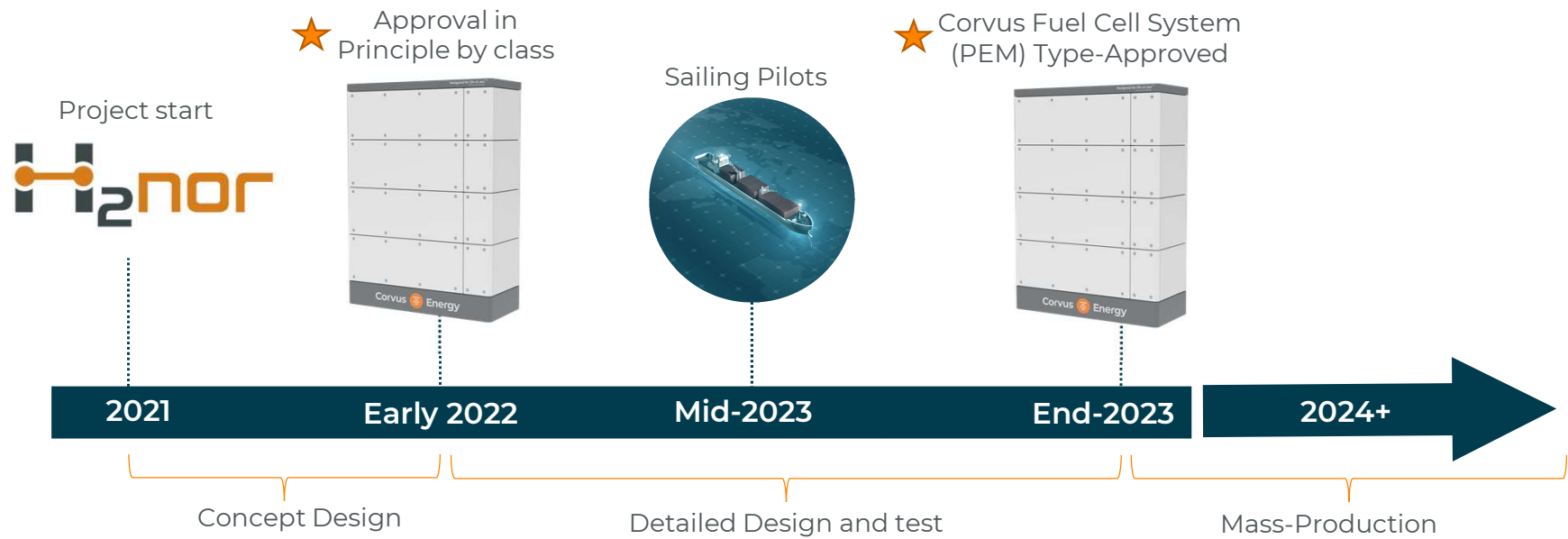


Funded by  Innovasjon Norge  Forskningsrådet

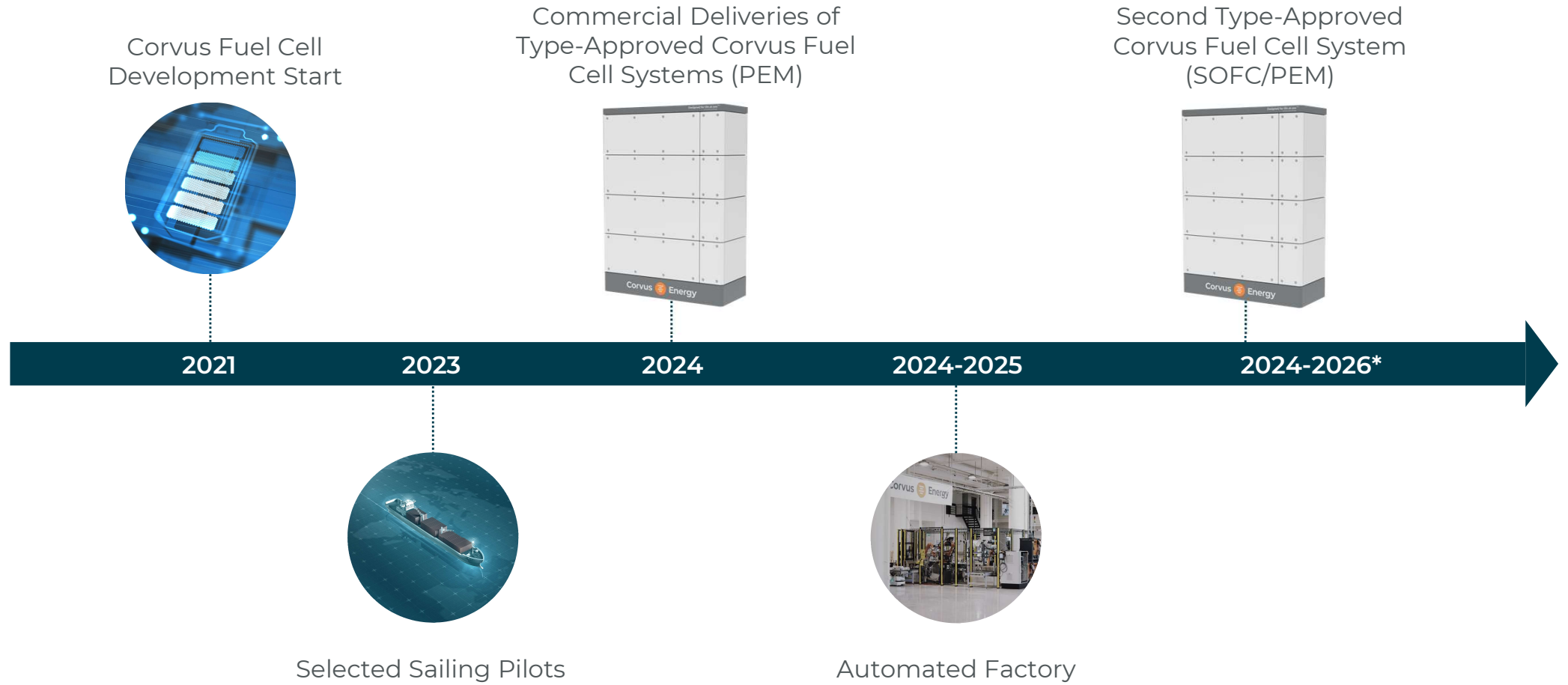
**H2NOR** **HyLOCD**



# H2NOR Timeline



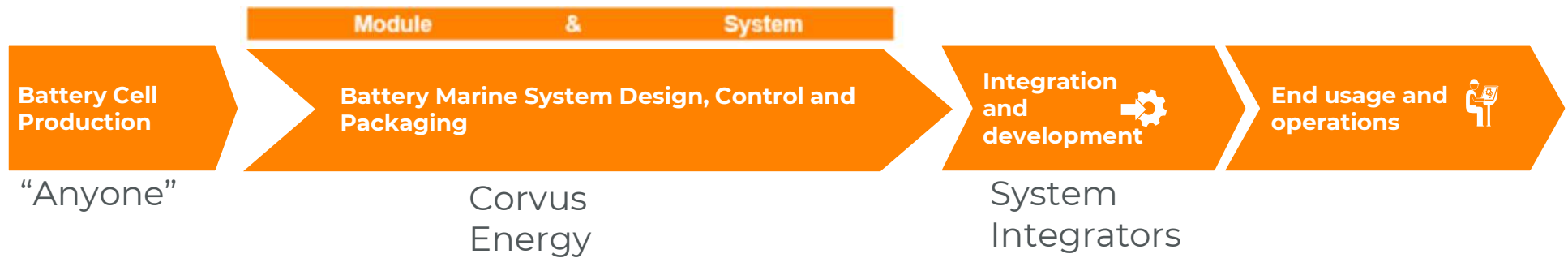
# Corvus Fuel Cell Roadmap



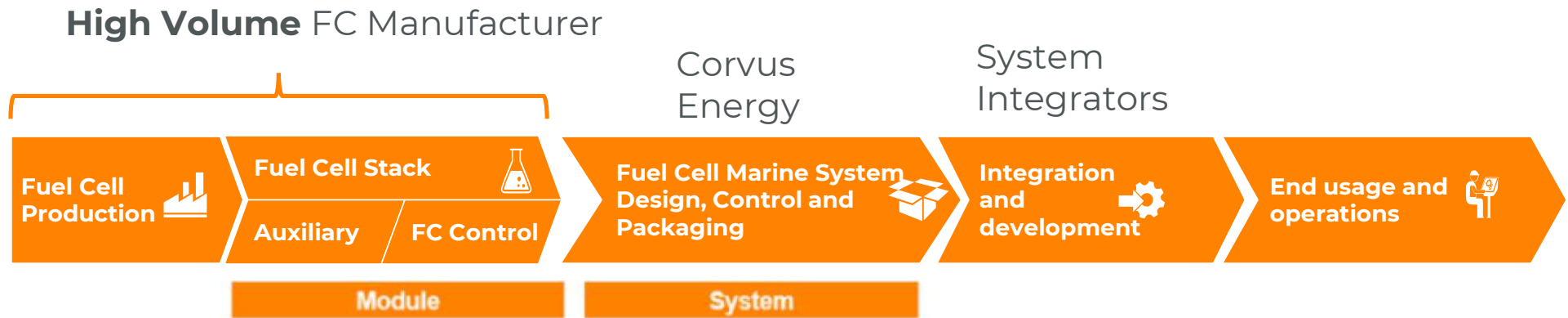
# Main project goals

- To develop, demonstrate and certify a mass-producible modularized maritime PEM-based Fuel Cell system with power supply ranging from 320kW to 10 MW within 31.12.2023.
- To develop and set in operation a FCBIS – Fuel Cell Battery Information System enabled with operational guidance and prepared for continuous enhancements within 31.12.2023.

### Battery Value Proposition

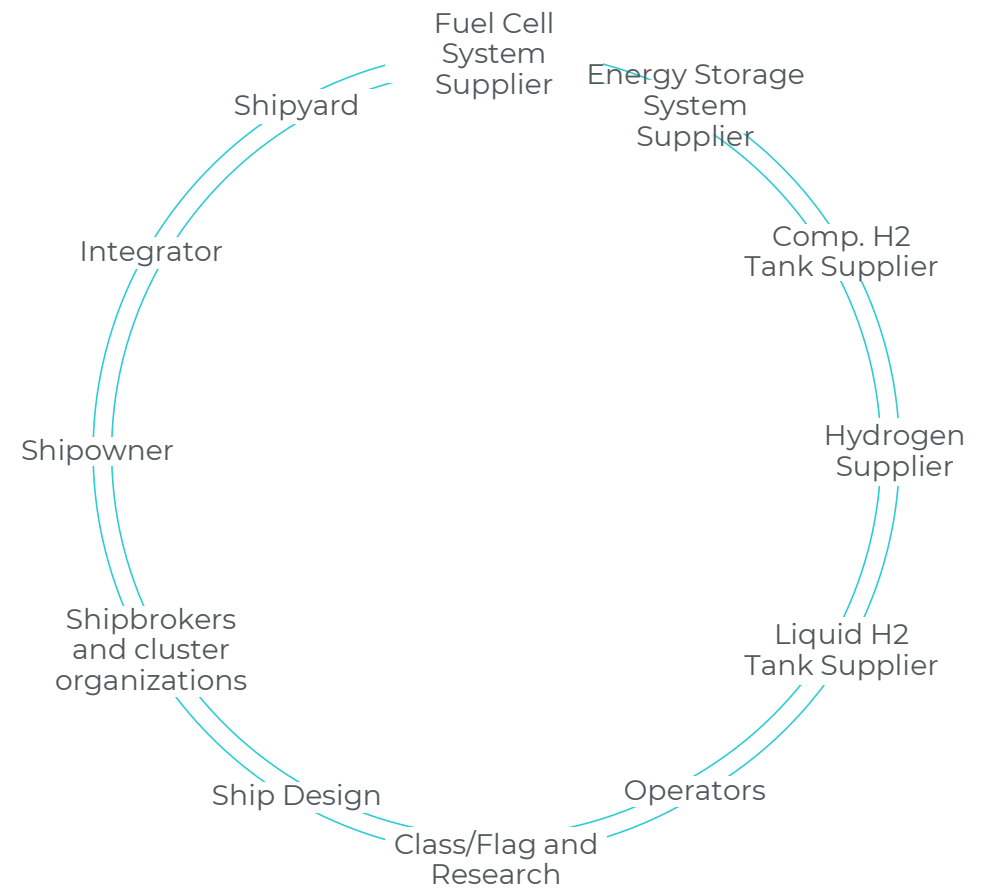


### Fuel Cell Value Proposition



# Why Corvus Energy?

- **Solidity and knowledge in marine product development**
- **Design and operation - FCBIS Software Simplify and optimize for customers / system integrators**
- **Strong partners with high production volume resulting in a cost-competitive and high-capacity product**





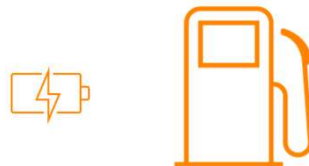
# Future Green Energy Carriers



**90% - 10%** Short Distance Routes

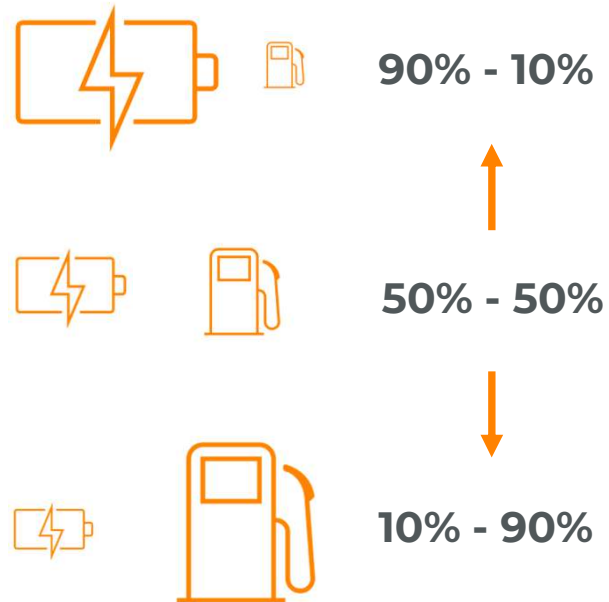


**50% - 50%** Majority of vessels



**10% - 90%** Long Distance Shipping

# Future Green Energy Carriers



## Cost of Ownership (Opex & Capex)

### Cost of Energy/Fuel

- Electricity
- Hydrogen
- Other Fuels

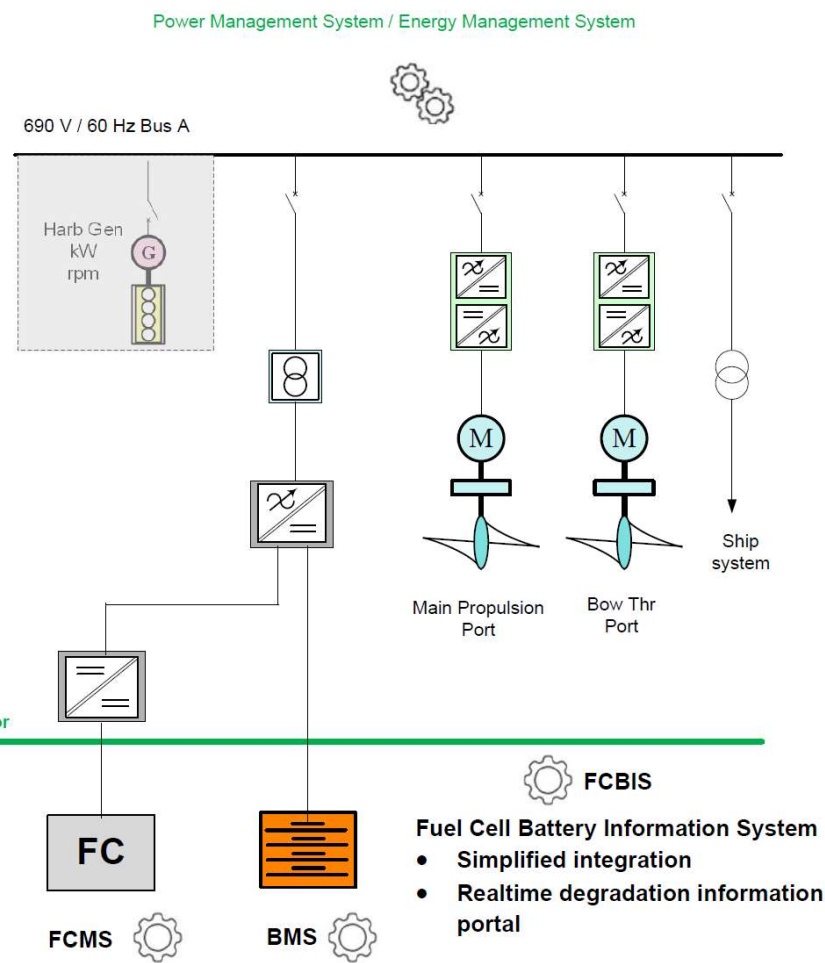
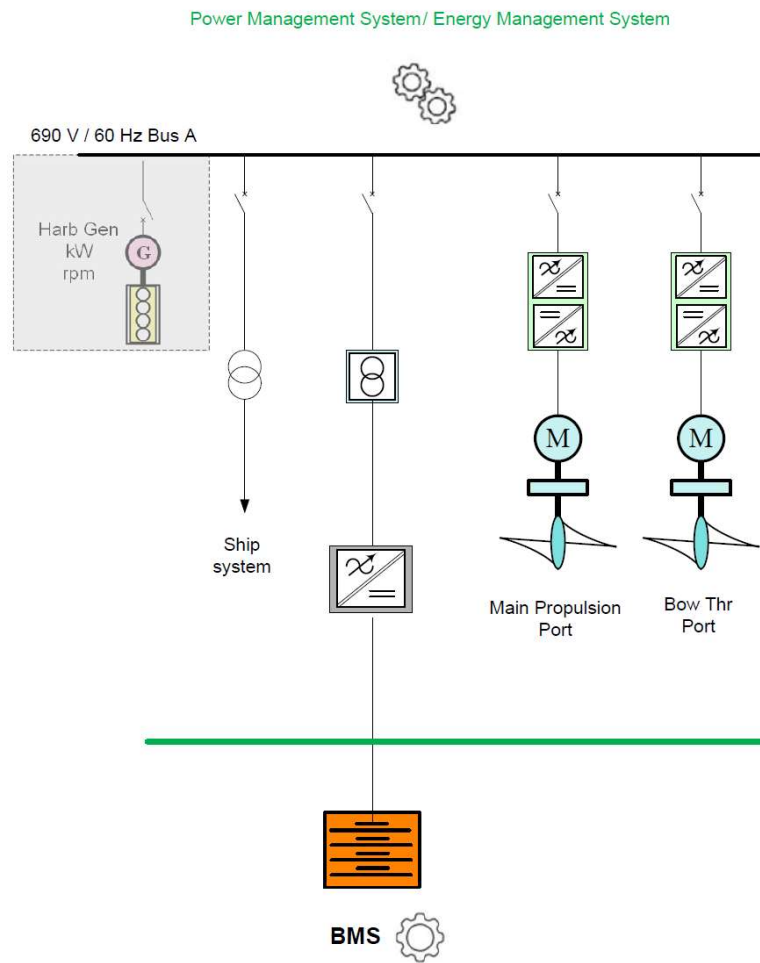
### Cost of Power System

- Fuel Cells
- Combustion Engine
- Battery System
- Aux equipment

### Cost of Operation

- Degradation / Wear and Tear
- Service
- Dual Energy – What and when

# Current vs. Future Corvus System Deliveries



System integrator

Corvus

## *The next generation of marine fuel cell systems*

- Questions ?





Thank you!

-> *Get insight into one of the big green shift development programmes,*

-An introduction to the Fuel Cell project from Corvus Energy and the H2NOR consortium.

*Abstract:*

Corvus Energy is an established manufacturer of Energy Storage Systems (ESS)- ie. battery systems- for the maritime industry.

H2NOR, a consortium consisting of Corvus Energy, with big partners such as Toyota, Equinor, Norled Wilhelmsen, LMG, USN, Maritime Cleantech (+ other supporting partners) are now developing a marine fuel cell system with hydrogen as fuel,

*“The next generation of marine fuel cell systems”*

