

Sveinung Odegard



**NSRP Presentation  
September 13th,  
2021**

# The Company



## Supplier of ESS

- Founded in 2009
- HQ in Norway
- Production in North America & Europe
- Global sales and service network
- 160+ employees



## The team

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



## Ownership

- Privately held ownership
- Strong industrial owners
- Investors in clean energy
- Long term focus



# Locations

Ålesund  
Bergen  
Porsgrunn  
Copenhagen

Vancouver

Seattle

Tokyo

Singapore

## Bergen, Norway

- HQ
- Manufacturing
- Sales
- Project
- Service

## Porsgrunn, Norway

- Sales
- Manufacturing
- R&D
- Service

## Ålesund, Norway

- Sales

## Vancouver, Canada

- Manufacturing
- R&D
- Sales
- Project
- Service

## Seattle, US

- Sales

## Roskilde, Denmark

- Sales

## Singapore

- Sales

## Tokyo, Japan

- Sales
- Service



440

Projects

>3 500 000

Operating hours

340+

MWh

114

Car and  
Passenger  
ferries

25

Cruise  
and Yachts

64

Offshore  
and Subsea

70

Tugs/Workboat/  
Fishing/Research

24

Merchant  
vessels

143

Port  
equipment  
Shore stations ++

# Market Development North America

## Globally:

> 340 MWh - 297 Vessels – 143 Cranes  
> 3,500,000 operating hours accumulates.

## North America:

➤ 35 MWh total capacity - 29 vessels – 29 RTG Cranes  
➤ 11 Land based drilling



2 + 4



2x



2x



2 + 4



12 vessels delivered, or to be delivered, according to USCG & ASTM F3353

Ports  
&  
Land Drilling



25x



11x



4x







# The Power of Energy Storage Technology

# How do you achieve the benefits?



## Zero emission! (The ultimate goal)

- No running engines
- No emissions
- No noise

## Hybrid / Partially Zero Emissions Operations



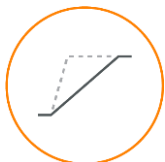
### Peak Shaving

- Reduce power peaks
- Improve fuel efficiency
- Reduce engine hours



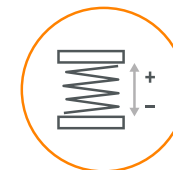
### Spinning Reserve

- Backup energy
- Reduce no of engines
- Reduce engine hours



### Dynamic Performance

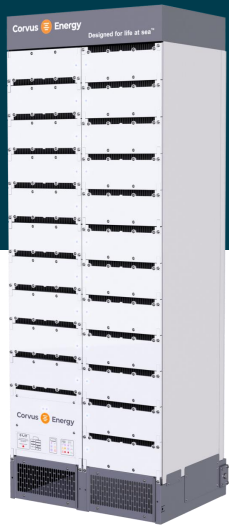
- Instant power
- Mitigate engine response



### Energy Regeneration

- Optimize lifting operations
- Fuelsaving

# Corvus Energy Storage Solutions (ESS)



Corvus  
Orca Energy



Corvus  
Blue Marlin



Corvus  
Blue Whale



Corvus  
Dolphin

Energy and Power



Corvus  
Moray

Energy and Power



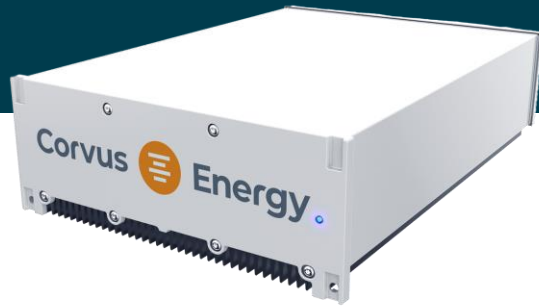
Corvus  
BOB Container



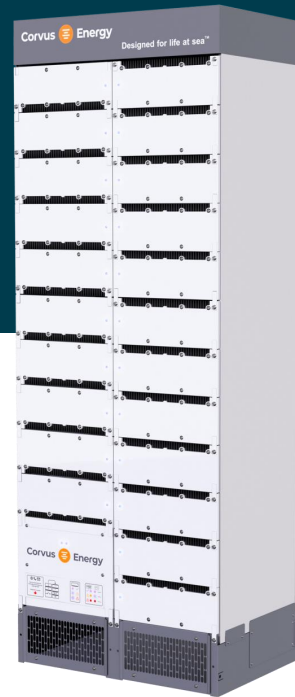


Orca Energy  
The preferred ESS for  
high C-rate  
applications

# Corvus Orca Energy System Description



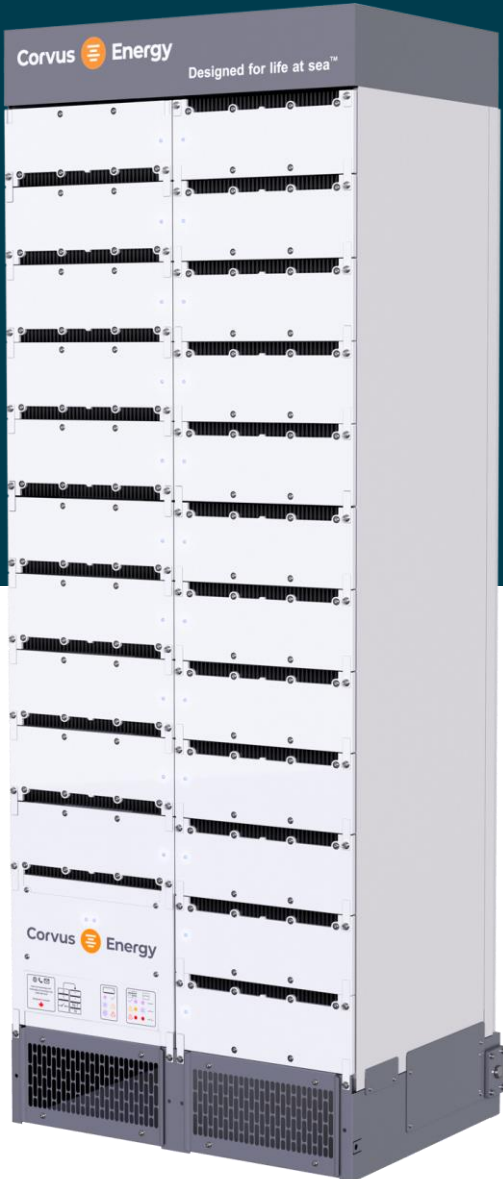
Battery Module



Battery Rack



Battery Room  
installation



# Corvus Orca Energy

Orca Energy is ideal for applications that are in need of both energy and a high power, moving large amounts of energy at an inexpensive lifetime cost per kWh.

### Features

- High C-Rates – up to 3C continuous
- Designed for voltages up to 1200 VDC
- Low installation and commissioning time
- Low life cycle cost
- Contained power connections
- Flexible and modularized design
- Passive single cell Thermal Runaway protection

### Options

- Voltage
- Aircooled or liquid cooled
- Vertical, horizontal or split installation

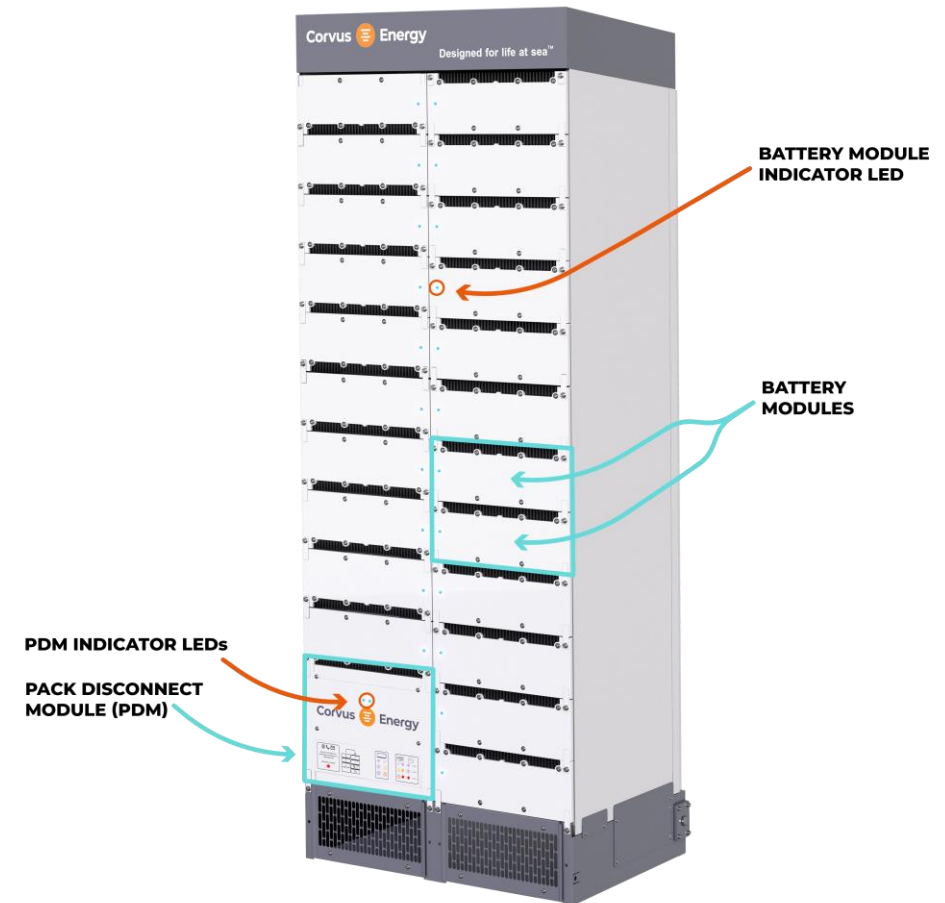


# Corvus Orca Energy specifications



## Orca Energy battery module specifications

Chemistry	Lithium ion NMC / graphite
Energy	5.65 kWh
Capacity	128 Ah
Dimensions	420 x 163 x 590 mm
Weight	60 kg
Maximum Voltage	50 VDC



# State-Of-The-Art Battery Management System

## Battery Management System (BMS)



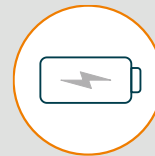
Cell temperature



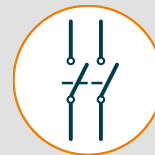
Voltage



Current



Charge /  
discharge limits

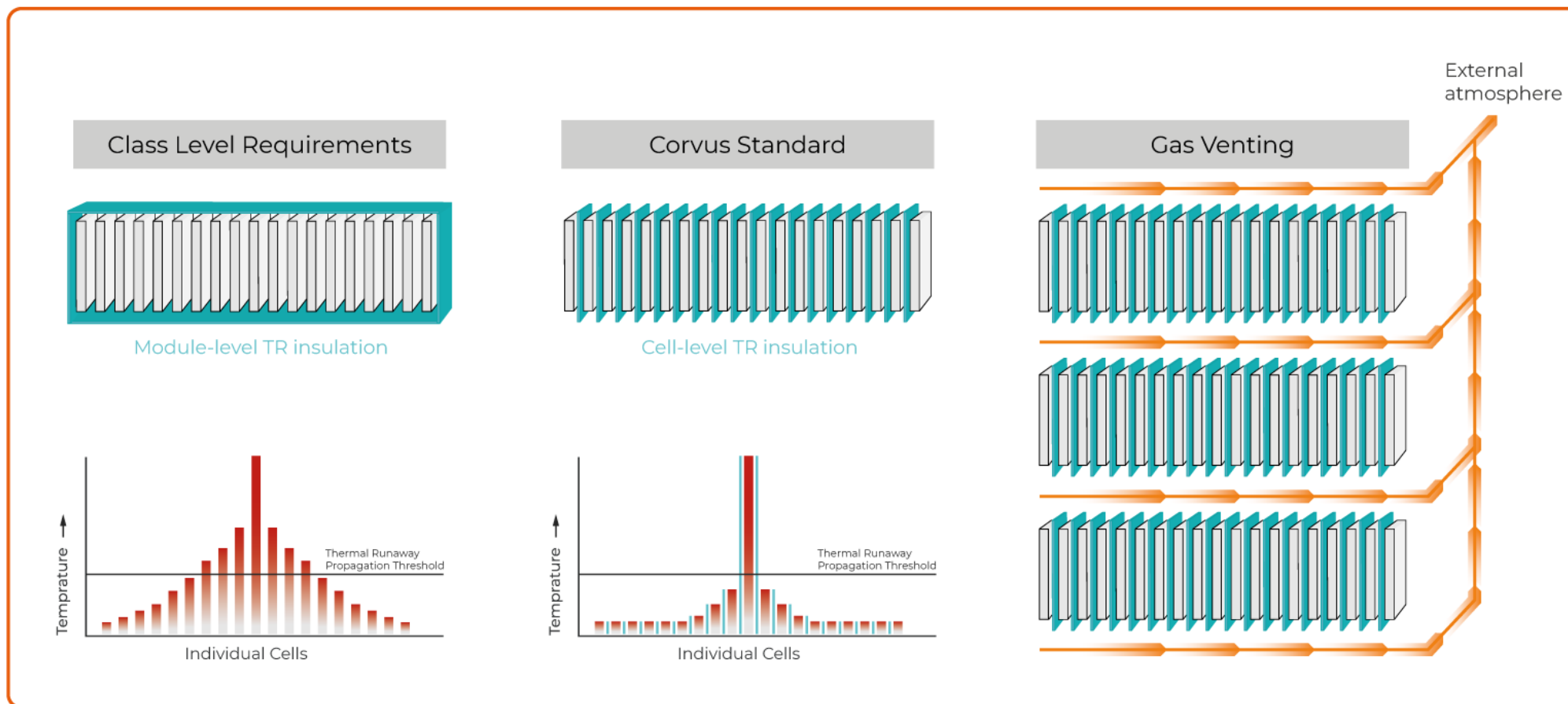


Safety  
Disconnect

# Safety Features

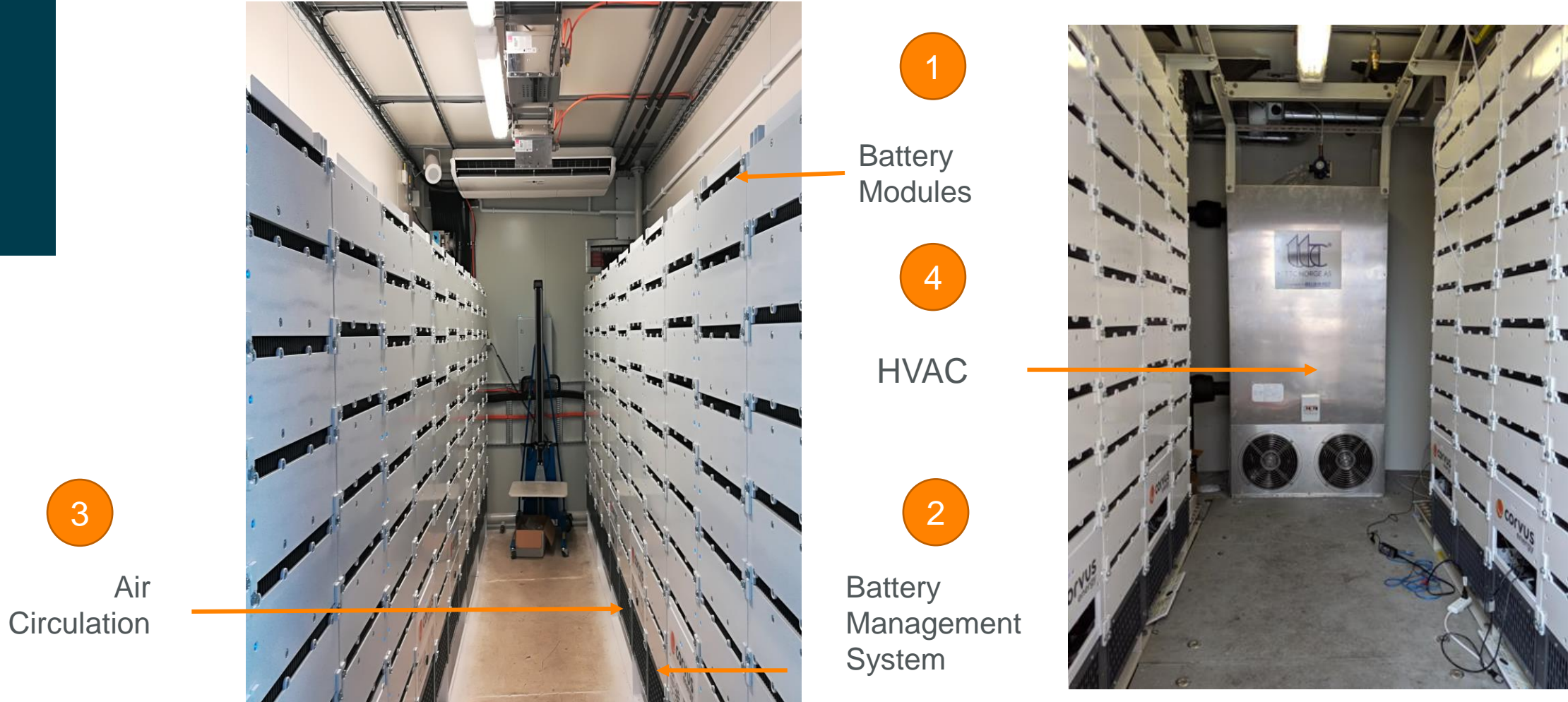
## PASSIVE SINGLE-CELL THERMAL RUNAWAY INSULATION

● INSULATION ● HEAT ● EXHAUST GAS



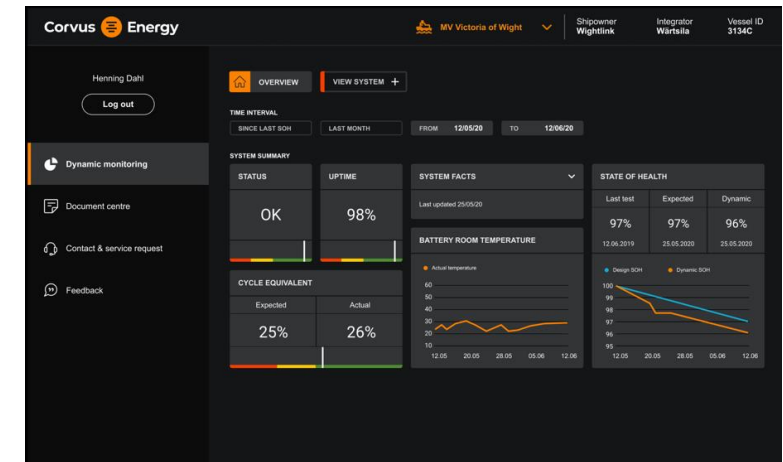
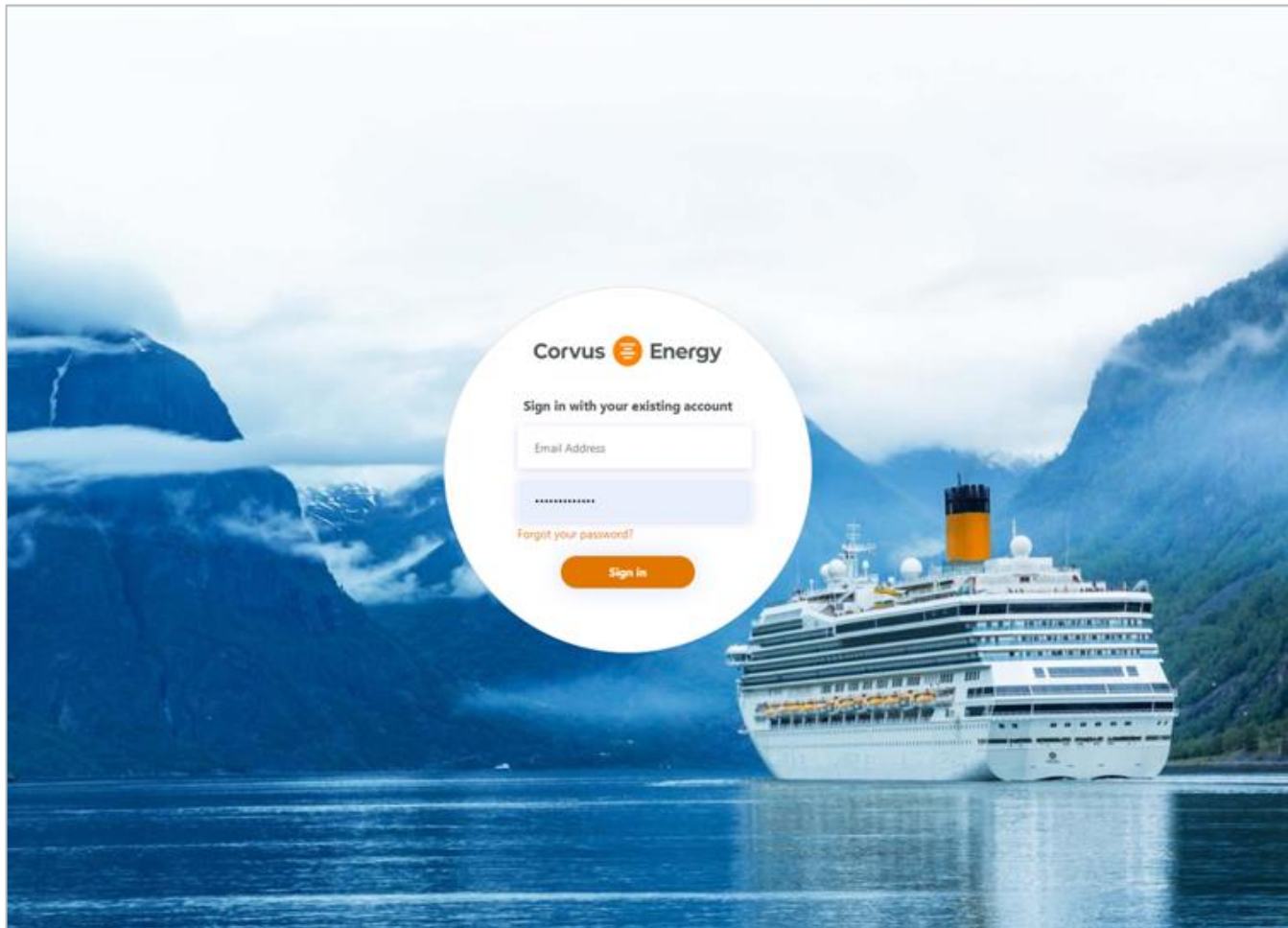


# Forced Air Cooling Simplicity and Reliability

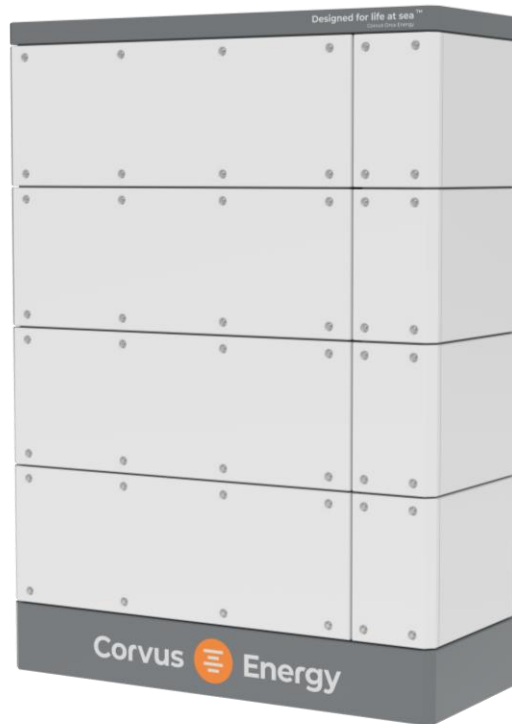


# Driving digitalization further

Monitoring through the Corvus Customer Portal



# Future Green Energy Carriers



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



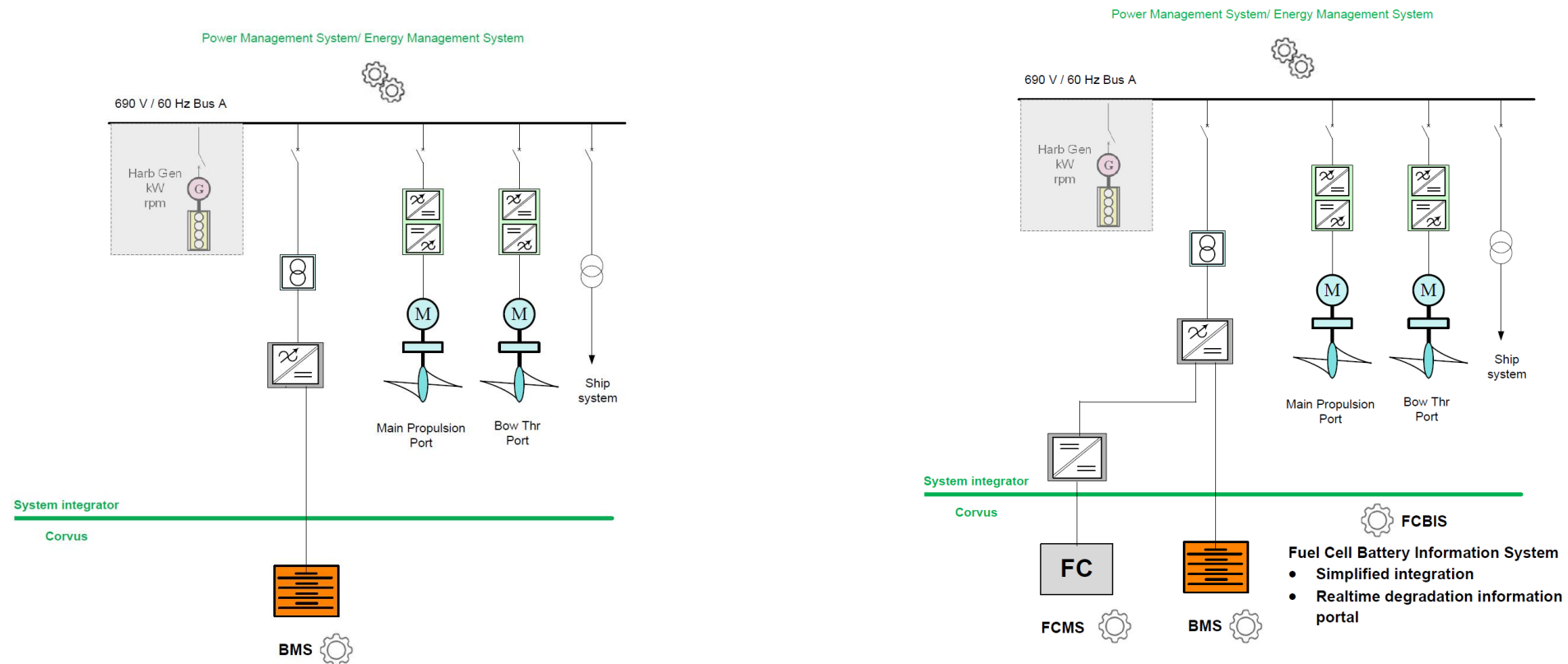
**50% - 50%** Majority of vessels



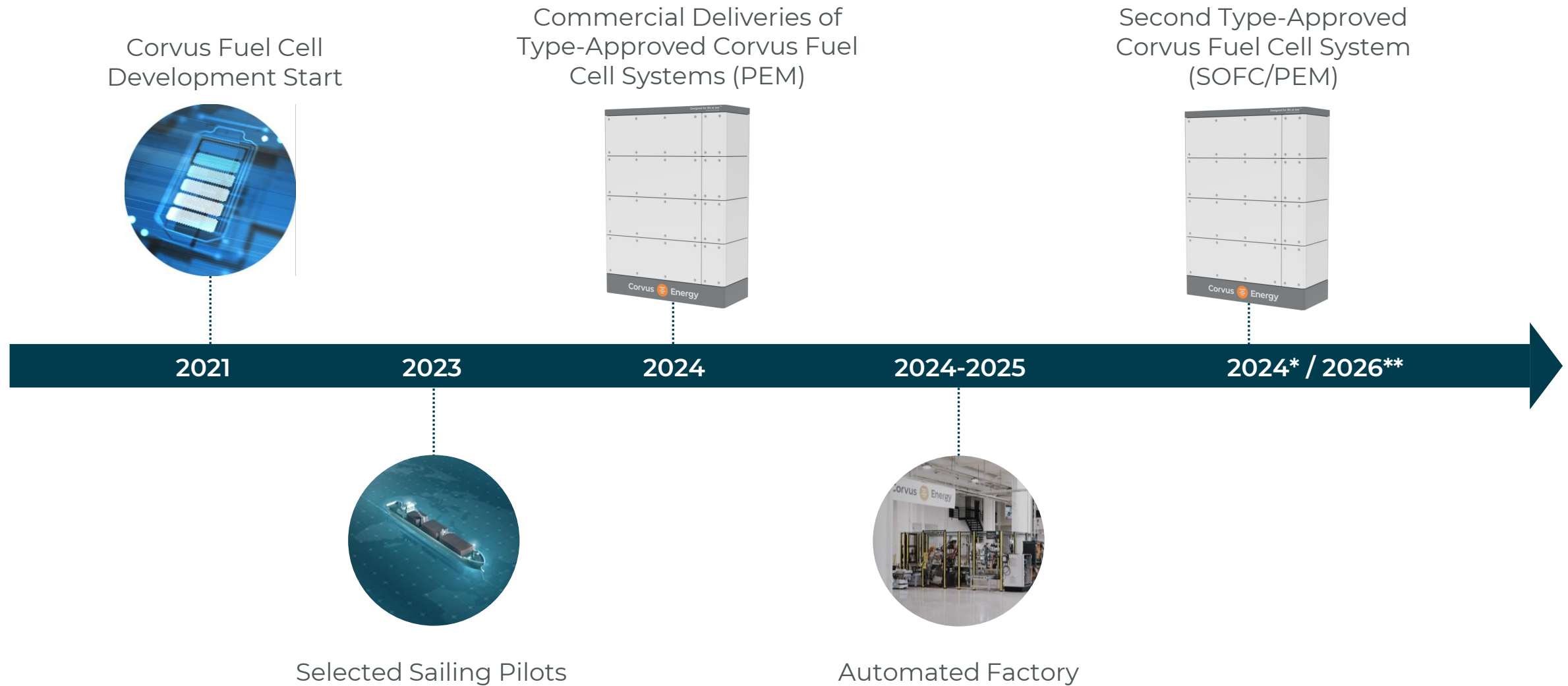
**10% - 90%** Long Distance Shipping



# Current Corvus System Deliveries



# Fuel Cell Long-Term Roadmap



# Thank You!

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Corvus  Energy

