The Company

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

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

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

Supplier of ESS
The team
Ownership
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

Singapore
- Sales

Tokyo, Japan
- Sales

Roskilde, Denmark
- Sales
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

Ports

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

Land Drilling
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
Corvus Moray
Corvus BOB Container

Energy and Power
Energy and Power
Orca Energy
The preferred ESS for high C-rate applications
Corvus Orca Energy System Description

- Battery Module
- Battery Rack
- Battery Room installation
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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>Lithium ion NMC / graphite</td>
</tr>
<tr>
<td>Energy</td>
<td>5.65 kWh</td>
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<tr>
<td>Capacity</td>
<td>128 Ah</td>
</tr>
<tr>
<td>Dimensions</td>
<td>420 x 163 x 590 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>60 kg</td>
</tr>
<tr>
<td>Maximum Voltage</td>
<td>50 VDC</td>
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</tbody>
</table>
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

Class Level Requirements
- Module-level TR insulation

Corvus Standard
- Cell-level TR insulation

Gas Venting
- External atmosphere
Forced Air Cooling
Simplicity and Reliability

1. Battery Modules
2. Battery Management System
3. Air Circulation
4. HVAC
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

Corvus Fuel Cell Development Start

2021

Selected Sailing Pilots

2023

Commercial Deliveries of Type-Approved Corvus Fuel Cell Systems (PEM)

2024

Automated Factory

2024-2025

Second Type-Approved Corvus Fuel Cell System (SOFC/PEM)

2024* / 2026**
Thank You!

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