Electrifying the Future of Naval Design

Simulating the optimum Power & Propulsion system
The benefits of:
- Onboard DC Grid™
- Azipod® Electric Propulsion
- Integrated Energy Storage Systems

Leveraging the wider benefits of COTS derived technology

Gunnar Hide, VP Sales – Coast Guard & Navy
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Positioned across global markets

Employees
~105,000

Countries
>100

Revenues
~$29 bn

Europe
~$10.3 bn

Americas
~$9.6 bn

AMEA
~$9.6 bn

ABB is a technology leader in **electrification** and **automation**, enabling a more sustainable and resource-efficient future.

The company's solutions connect engineering know-how and software to optimize how things are **manufactured**, **moved**, **powered** and **operated**.

Figures as of 2022

ABB Marine & Ports

Our customers benefit from more than 100 years of experience in the industry

Coast Guard & Navy

- Leveraging the technological advances for commercial vessels into real operational benefits for the Coast Guard & Navy segment

Ice-going vessels

- Independent and economically efficient operation in harsh ice environment
- Safe operations for both people onboard and the sensitive arctic environment

Passenger vessels

- Outstanding maneuverability and vessel control for increased passenger safety and comfort
- Proven operational efficiency gains

Offshore vessels

- Maximized asset availability with reliable operating systems
- Immediate response time when required
- Optimal operational performance under all operating conditions

Cargo vessels

- Improved operational efficiency and reduced fuel consumption
- Compliance with future regulations
- Quality solutions at competitive prices for improved capex

Coast Guard & Navy
Electrifying the future of Naval Design

German Navy - F126

"We selected ABB to supply **the integration of power and distribution systems** for the F126 Frigates because of their **outstanding expertise in DC power systems,"** says Damen Naval Managing Director Hein van Ameijden.

Spanish Navy – Juan Carlos 1

The first **Azipod® propulsion** retrofit order for a naval vessel, replacing the existing system onboard the Spanish Navy flagship, Juan Carlos I

MO1800-S2800 Double winding

Royal NL / BE Navies - ASW Frigate

4 x **CODLAD** vessels. System integration for complete delivery of power generation, ESS, DC system, PEMS and electric motors.

Flexibility and modularity is the key word for these new vessels.

Simulating the Optimum Power Plant
Key Considerations

Optimized efficiency

- Reduced fuel consumption
- Higher productivity
- Lower lifecycle costs

Decarbonization

- IMO targets
- Emissions restrictions
- Public opinion

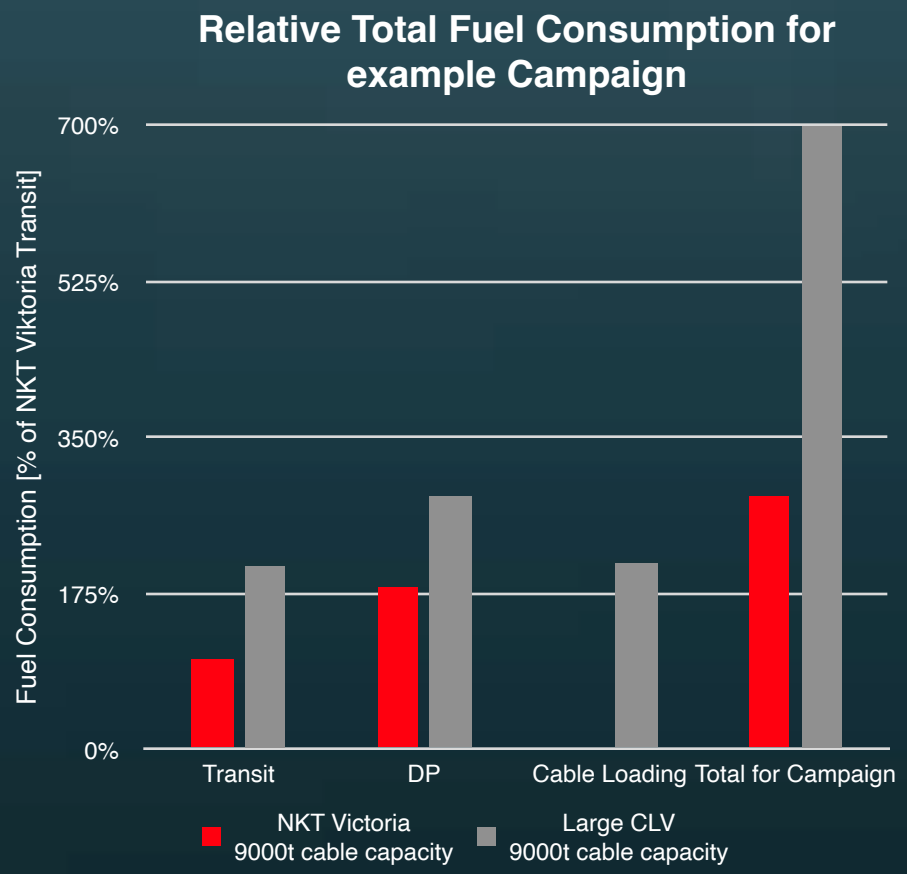
Safety and reliability

- Uninterrupted operations
- Avoidance of incidents

Circularity

- Reduce waste
- Extend product lifetime

Simulating the Optimum Power Plant

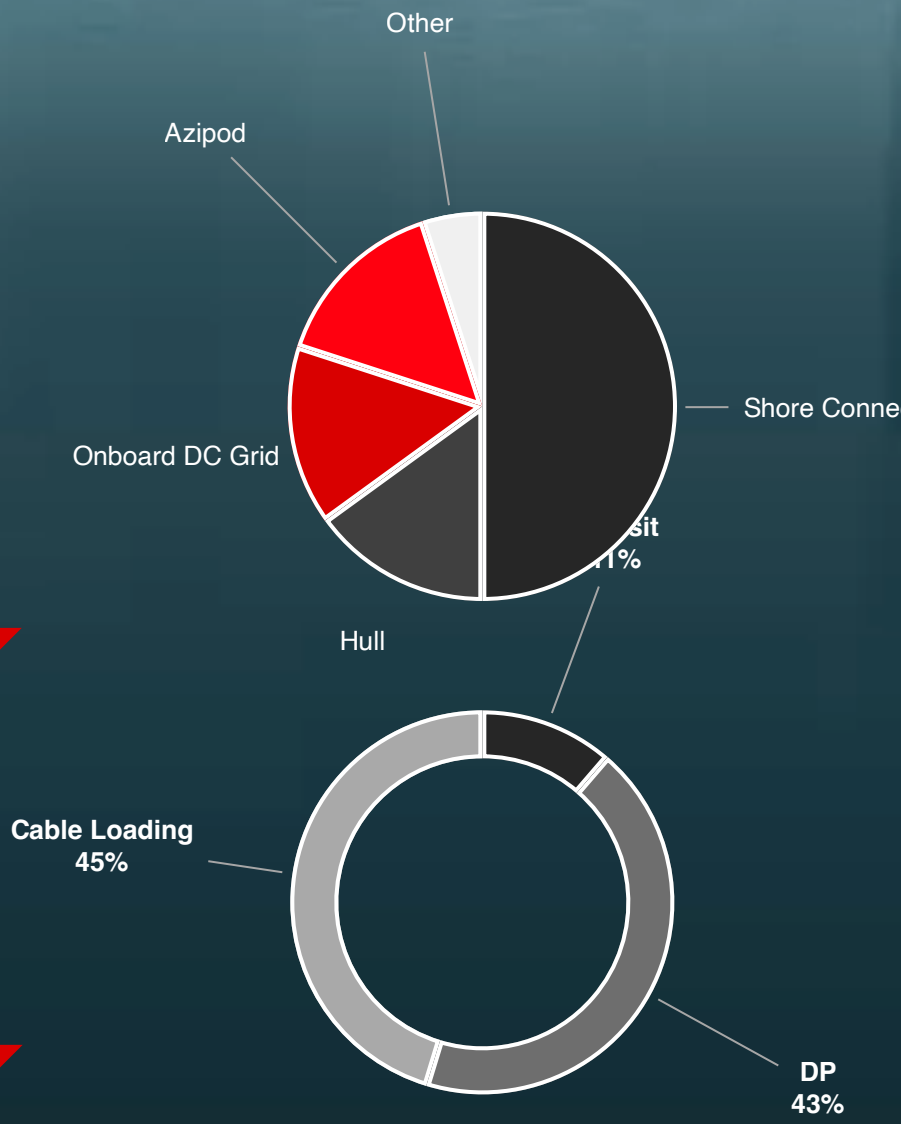


In total

59% ↓

w/o shore connection

42% ↓



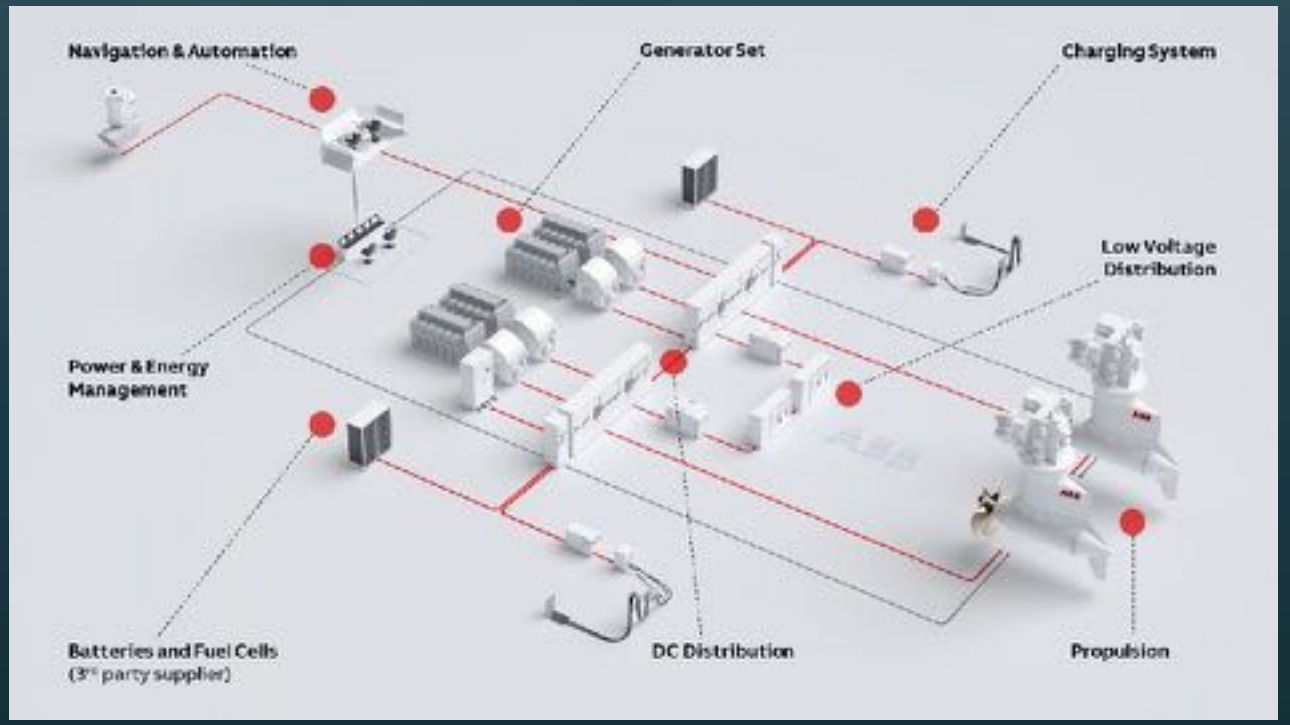
Simulating the Optimum Power Plant

System			Space & Weight		
P&P concept	Option	Propulsion type	Footprint	Volume	Electrical Weight *(excl. Prime Movers, motors & alternators)*
IFEP	LV DC	Azipod®	100%	100%	100%
IFEP	MV AC	Azipod®	179%	200%	145%
CODLAD	LV DC	Twin Shaft	100%	100%	100%
CODLAD	LV AC	Twin Shaft	162%	160%	128%

Onboard DC Grid™
The Navy Drive

Key Features

- Modular power system platform based on 1,000Vdc
- Practical power limitation of 6-7MW per consumer (dual winding utilized for increased powers)
- Flexible and functional integration of energy sources and loads
- Fault tolerant system with high availability
- Compact and efficient power system

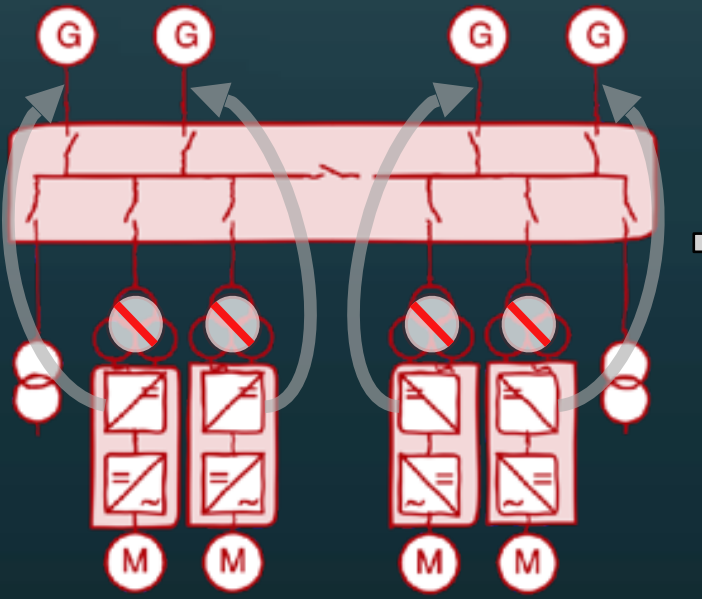


Onboard DC Grid™
The basic principles

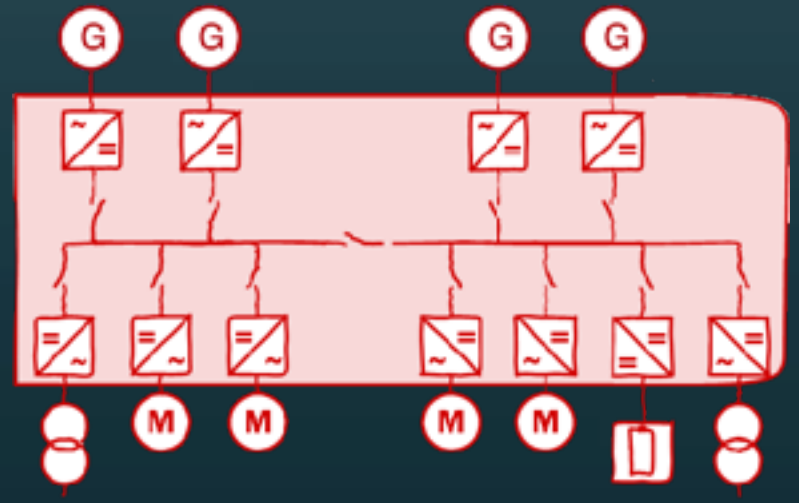
Driving Factors

- Enables variable speed generators
- Energy storage is mainly DC based
- Space & weight saving
- AC SWBD forces synchronicity
- AC SWBD bases protection on availability of large currents
- Simpler through life integration

Traditional AC System



Onboard DC Grid™



Energy Storage Systems

Spinning Reserve

Backup power to running generators.

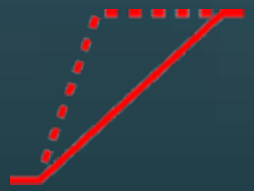
Benefits include
- Improved safety
- Reduced fuel consumption and engine maintenance

Peak Shaving

Level power seen by engines and offset need to start new engines.

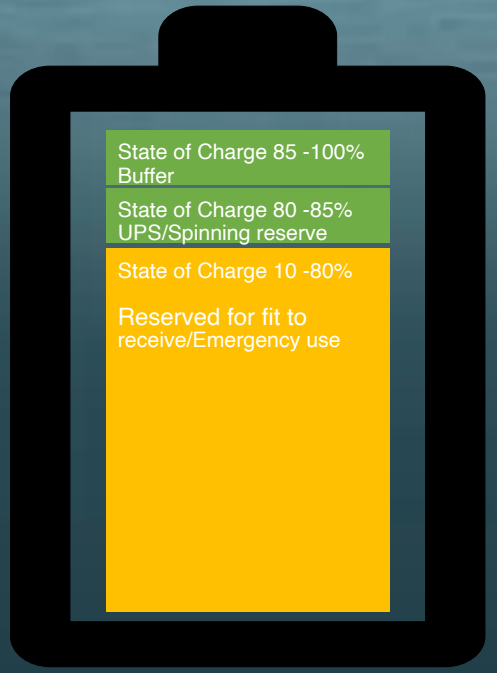
Benefits include
- Reduced fuel consumption and engine maintenance

Enhanced Dynamic Perf.



Instant power in support of running engines.

Benefits include
- Reduced fuel consumption
- Enabler for “slower” sources like fuel cells



Example: Battery voltage also temp dependent

Enhanced Ride Through

Short time backup power to running generators.

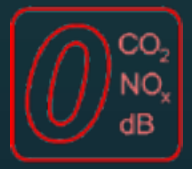
Benefits include
- Improved safety
- Reduced fuel consumption and engine maintenance

Strategic Loading

ESS used to charge or discharge with the aim of optimizing engine operating point.

Benefits include
- Reduced fuel consumption

Zero Emission Operation

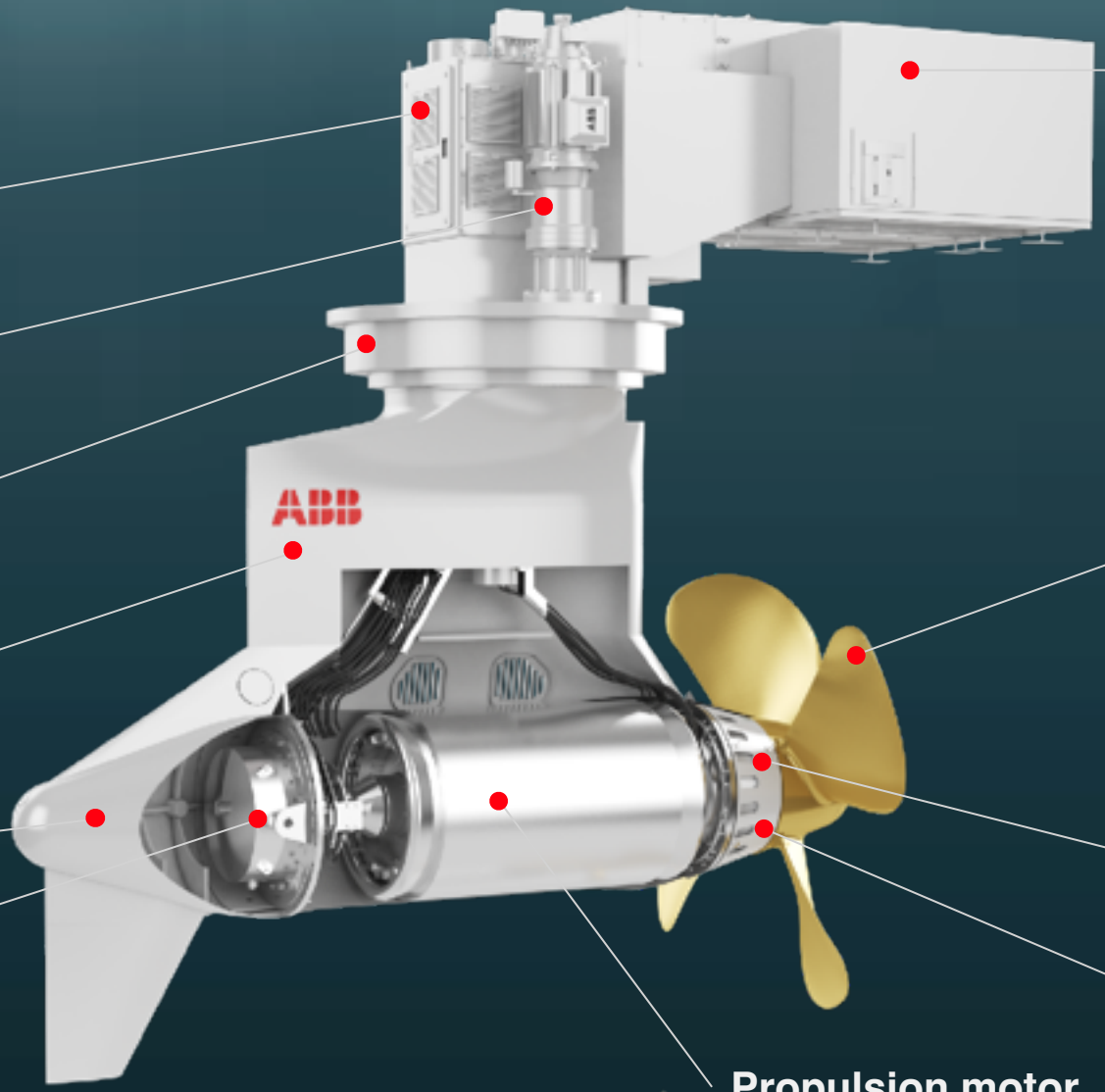


Power system is fully powered by ESS.

Benefits include
- Silent operations
- Zero emission operation

ABB

Azipod® DO



Slip Ring Unit (SRU)

Electric steering motors and planetary gearboxes

Slewing bearing and sealing

Welded hull

Hull cap

Thrust bearing unit

Hybrid cooling
- Stator cooled to sea water
- Rotor cooled by closed-loop air circulation (CAU)

Propeller
- Built up / Monoblock
- Aluminum bronze or Stainless Steel

Shaft sealing

Propeller bearing

Propulsion motor

Azipod® Key Facts & Figures

> 24 M
Hours of operation experience

300+
Vessels equipped with Azipod® propulsion

> 35
Ship types are equipped with Azipod® propulsion

> 30
Years of successful operation

> 99.8%
Vessel availability on average

1 - 22 MW
Unit power range

ABB

Norwegian Coast Guard Vessel Svalbard

The benefits of COTS derived systems

Optimized proven solutions

Decades of verified application across multiple demanding sectors.

Use of commerical components

Market leading, available, components developed for cross industry demands.

Low risk intergration

Designed for fast build, trials and acceptance, with ABB as a trusted partner to global ship builders.

Global support for the lifetime of the vessel

Optimized operation, on point modernization and upgrades paired with 24/7 expert support increases uptime and availability.

Future proof designs

ABB has long experience in developing new technologies into proven marine solutions.

ABB Dynafin™

Thank you!

Please join our team at Stand E17 for any questions.