

Bertel  Steen  
Power Solutions

# ELECTRIC & HYBRID POWER SOLUTIONS





# NAVIGATE TO ZERO EMISSION

Electric propulsion combined with battery systems is one important technology step for decarbonization of the maritime industry. Using green electric power from renewable sources for propulsion, in combination with effective onboard power and energy management systems, enables the maritime industry to reduce the harmful emissions from the operation of the vessels.

As a technology leader we work together with our customers towards a net-zero emissions future. We understand that each application is different and has its own specific demands, with our extensive competence we provide the perfect solution for your unique power requirements, from planning, through design, build, commissioning and service. Ensuring maximum vessel efficiency and reduced emissions and impact on the environment.



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# FROM IDEA TO OPERATIONS

With years of experience from working with professional customers operating on the toughest environments, we secure a power system fit for purpose.

As a leading integrator of maritime power solutions, we understand your need for a reliable power and energy system. We will guide you through the process of selecting the right solution for your vessels, with focus on high energy efficiency and uptime requirements.

Our experience with regulatory requirements, and the challenges of designing solutions matching the weight and size constraints of fast and compact vessels, secures smooth sailing through the process of building vessels meeting the your demand for more environmental operations.



**Technical and Commercial Advisory during Planning and Design**



**Selection of an Optimal and Energy Efficient Architecture**



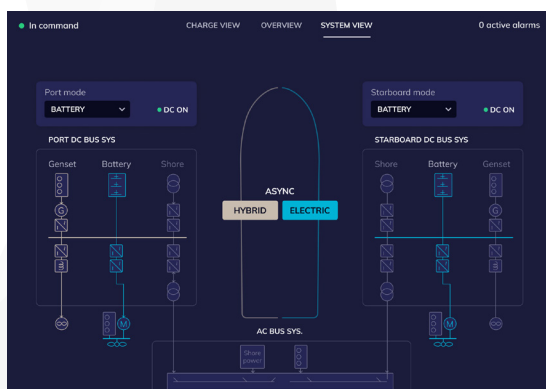
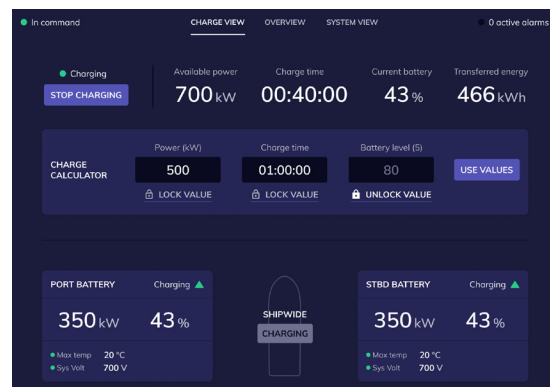
**A Modular and Flexible Design, Suited for the Vessel in Mind**

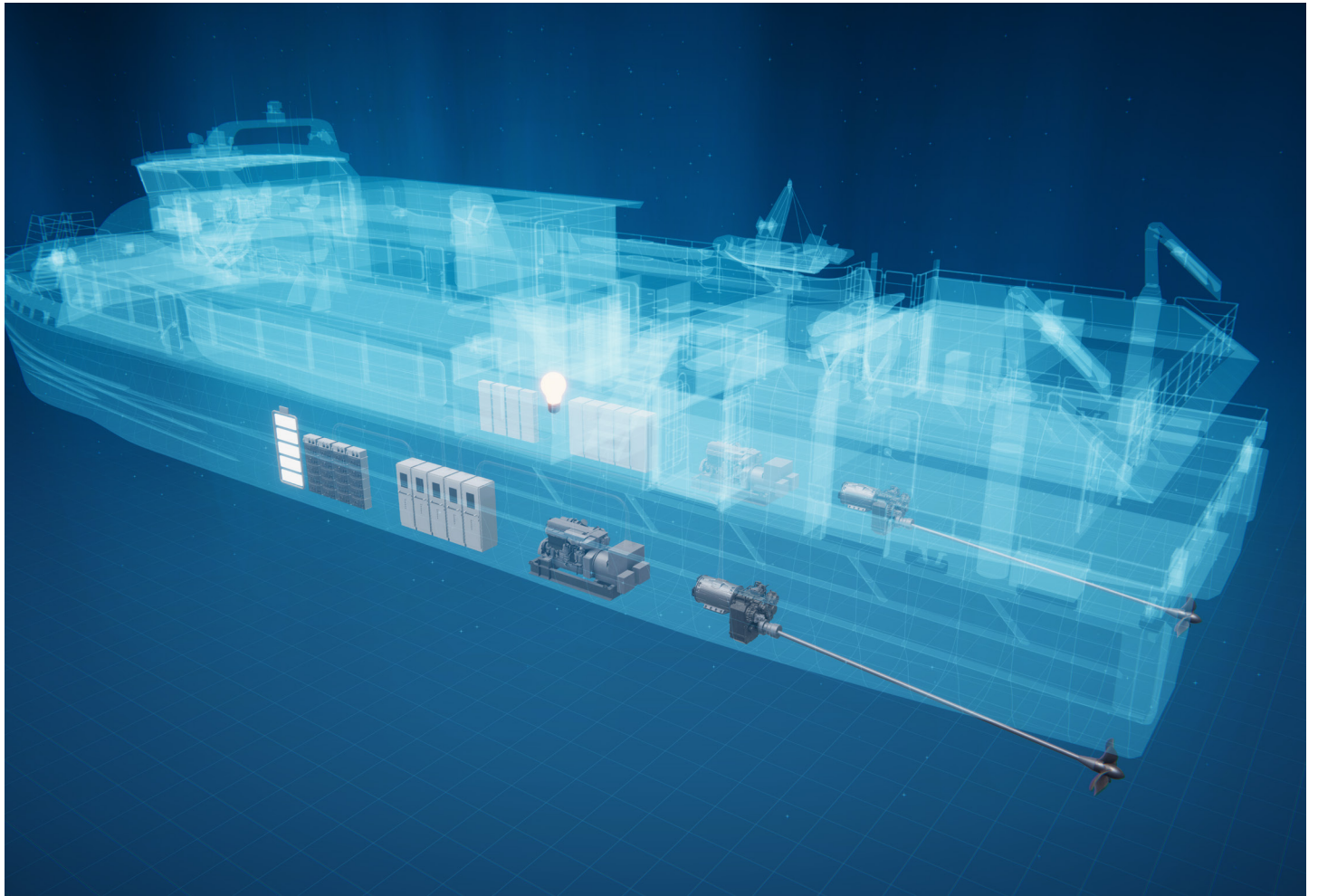
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# FLEXIBLE SOLUTIONS

The key to a successful implementation of a low and zero emission operation is in a flexible and effective power and energy system tailored to the various propulsion systems architectures designed for the vessels operation and the physical weight and space constraints.

Our MOVEe Power and Energy management System (PEMS) is a modular and a flexible solution that is well suited to both pure electric and hybrid propulsion systems. This makes it easy to adapt the solution to the various vessel configurations and needs. The smart and intuitive HMI user interface is configured to the vessel configuration, securing that the operator can focus on the secure operation of vessel.





# FROM DRAWINGS TO WAKE

BOS Power Solutions offer a complete integrated power and energy system for electric and hybrid propulsion systems, based on best of breed marine propulsion components and technologies.

We secure compatibility and interworking of the various sub-systems, from the bridge controls to the propulsors. This gives you a “one stop shop” system integration including any required shore based power systems supporting your zero emission operation.

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**Integrated Power and Energy System**  
- from Bridge to Propulsor



**Compact and Light Weight Systems**



**Tailored to Customer and Vessel Type**



**Modular and Flexible Design**



**Energy Efficient Architecture**



**Extensive Service Offerings and Value Care**





# YOUR UPTIME SECURED

With more than 50 years of experience in supporting professional marine operators, we understand that an efficient and responsive service offering is key to securing the uptime of the operations.

Our large team of competent service technicians, combined with quick access to parts and extensive workshops capabilities for planned maintenance, are key elements in the service offering from Bertel O. Steen Power Solutions. Efficient value care agreement and digital solutions with remote connectivity secures the end-user's operation and makes trouble shooting easier and solves problems quicker.

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**Support Throughout the Life Time**



**Maximize Uptime**



**Digital solutions**



# DIGITAL SOLUTIONS

We offer you the best possible system operations support and service by using digital technology in a holistic service approach. This helps you operate your equipment more effectively 24/7 and improves our service to you.

Our digital solutions will in the future analyse system data quickly for troubleshooting to efficiently implement and perform service tasks, either independently or together with our service technicians.

## Data Access & Tracking

By Remote monitoring you will have online access to all relevant equipment data. With flexible communication alternatives and software solutions to ensure optimal connectivity. All-important data and alarms are available for monitoring and analysis. Always adhering to the to the highest data privacy and security industry standards technicians.



Flexible communication



Easy service support



Remote monitoring and analysis

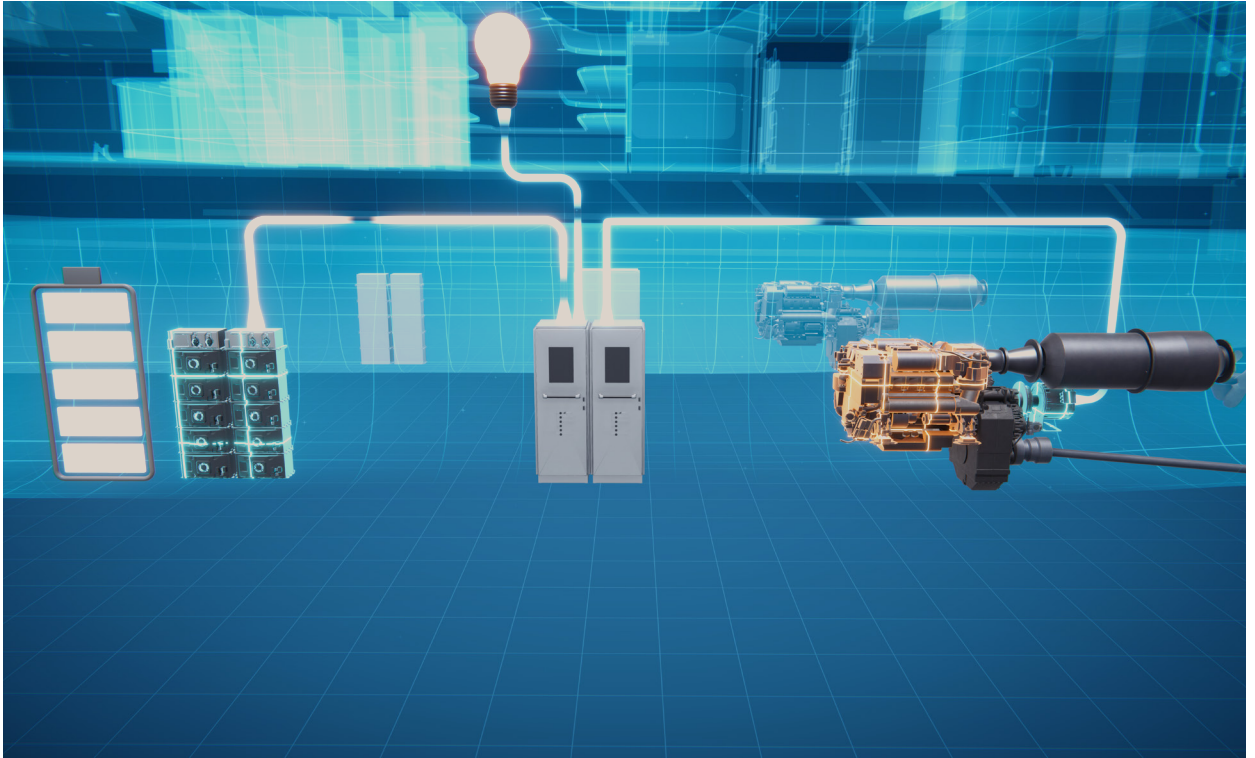


# MAKING TECHNOLOGIES PLAY TOGETHER

Hybrid and electric propulsion solutions for small, compact, or fast crafts requires special attention on 'fit for purpose' components and sub-systems.

With a wide range of factors to consider when optimising a power and energy system for such vessels, the solution is to base the design on 'best of breed' technologies from various suppliers. Deep understanding of the various sub-systems and being able to select the right combinations, requires a breadth of competences and experiences. BOS Power Solutions takes pride in our name and designs complete power and energy systems that are fit for purpose for the vessel it is intended in. We ensure the interworking of technologies and an optimal design for the end-user's operation, giving you peace of mind for your next move.





# ELECTRIC PROPULSION

Electric propulsion is the most efficient power system architecture for vessels that can predominantly operate on the energy stored in the battery system.

These vessels typically have an operation profile with limited duration or energy consumption between each charging opportunity, such as commuter ferries, sightseeing vessels, and work boats with low energy consumption during operation. The main propulsors (CPP, FPP, waterjet, thrusters etc.) are driven by an electric motor with PM technology for high energy efficiency and lighter weight, or a traditional asynchronous electric machine for lower cost. A diesel generator set is used to supplement the energy stored in the battery system for longer operations.

The individual operation profile of the vessel will determine the recommended architecture selection and the selection of optimal component technologies. This approach enables the system to be optimized in terms of cost and energy usage, as well as meeting regulatory requirements for classified vessels or vessels with passenger certificates.



Zero Emission Operation

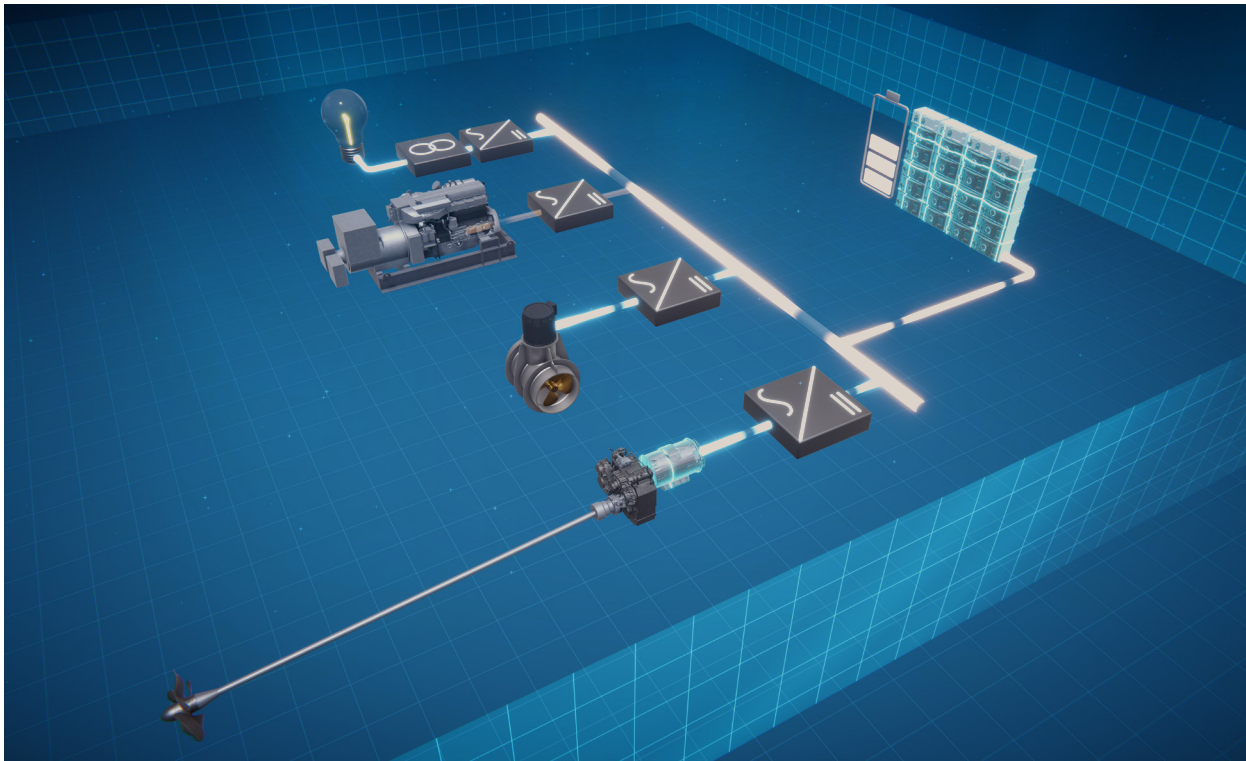


Energy Optimized



Flexible Design

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# HYBRID PROPULSION

When the vessel operation profile require more energy than what practically can be stored in the battery system, a hybrid propulsion system architecture can be the right choice.

In a hybrid configuration, the main propulsors (CPP, FPP, water jet, thrusters etc.) can be driven by both a diesel (-mechanic) engine and an electric motor by use of a PTI/PTO or combining (2 to 1) gear. The choice of electric motor technology depends on the design philosophy as for electric propulsion.

The operator will select to power the propulsion by the diesel engine, electric motor or both (boost mode). The selection of the power mode is done by the BOS Power PEMS control system. When operated on diesel engine power, the operator can also select to charge the batteries by using the electric machine as a generator on the PTO gear.

Dimensioning of the various power elements will depend on the operation profile and the operator's target for zero emission operation.



Reduced Fuel Consumption



Extended Operation



Flexible Operation Modes

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# CHARGING SYSTEM

There are many different solutions for charging of the batteries from shore power. Which solution to be most efficient depends on the onboard power system architecture and the power available from shore.

BOS Power guides you to the appropriate solution and includes the charging system in our supply to ensure correct interface and communication between the charging system and the onboard power & energy management system. Any application is available.



**Standardized or Proprietary AC Shore Power Solutions**



**DC Shore Power Solutions for Reduced Weight and Faster Charging**



**Standardized Automotive Charging Systems (CCS / MCS)**



# MOVEe POWER & ENERGY MANAGEMENT SYSTEM

BOS Power develops and delivers the MOVEe Power & Energy Management System (PEMS) to ensure optimum performance of the power system.

Thru the HMI smartness and user friendliness, the operator gets confidence that the vessel performs with the highest efficiency and accuracy.

The system redundancy is according to class society requirements, with a redundant state-of-the-art PLCs and hardware architecture, and communication based on a ring topology.



**Optimized System Performance**



**Intuitive User Interface**



**Fully Redundant**







# MAKE THE NEXT MOVE.

**Bertel O. Steen Power Solutions**  
delivers complete power solutions for  
ZEROemission operation of your vessels.

**Contact us**

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