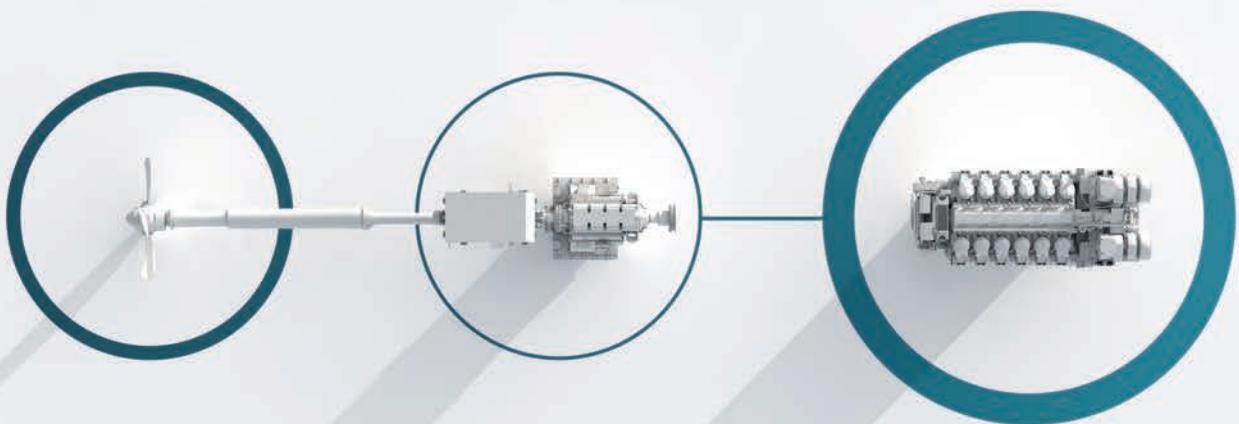


# Optimized propulsion systems

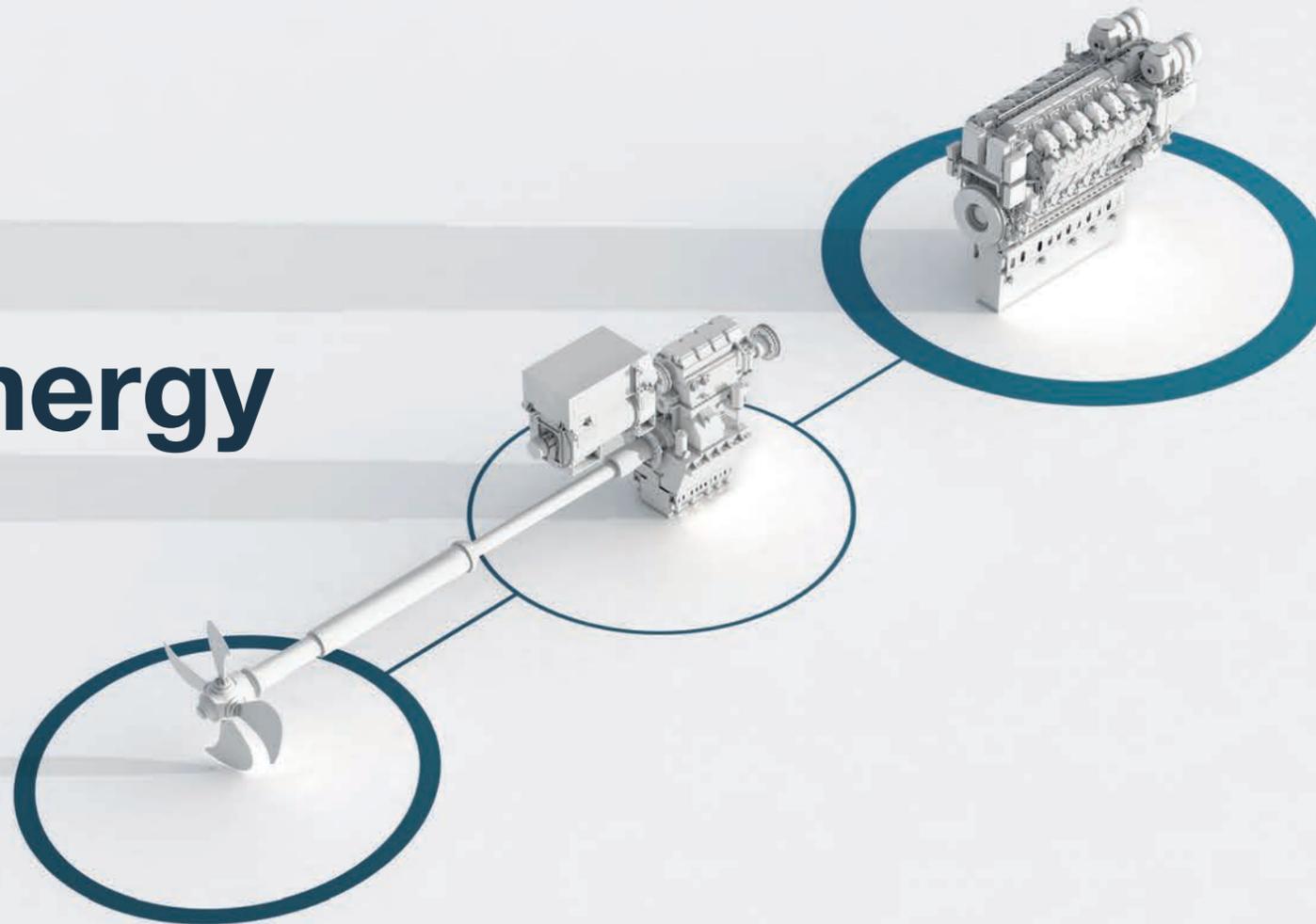
For over a century, MAN has been developing ever more sophisticated propulsion systems. Starting with the first Alpha controllable pitch propeller in 1902, we have steadily increased operational reliability and durability. Our innovative technologies have raised output and efficiency while decreasing environmental impact. We have also raised propulsion flexibility, with hybrid propulsion and gas systems allowing ships to apply different power modes more efficiently.

## Benefits at a glance

- Increased fuel efficiency
- Improved performance
- Solutions for your specific needs
- Optimized for your ship's operational profile
- All components from a single source



# In constant pursuit of energy efficiency



## A green approach to fuel costs

While still considered the most important form of bulk transportation, the shipping industry has recognized many potential areas for improvement. To stay competitive, it is necessary to keep operating costs as low as possible – including the cost of fuel, which represents one of the most pressing issues for ships. This means using environmentally friendly technologies that help ships use less fuel and cut energy consumption overall.

## Quality components tailored to your needs

We take a holistic approach to your ship, examining the operational profile to optimize all relevant components – from the engine to the rudder, including all speed, maneuvering and load control settings. Whatever your needs may be, we can design the most efficient propulsion system for your specific operational profile to make your ship greener. For example, our MAN Alphasonic 3000 propulsion control system optimizes propeller function as well as engine operation for better maneuverability and overall efficiency.

Together with our affiliates RENK (gearboxes) and AKA (hybrid propulsion systems) we can create innovative solutions for the complex propulsion needs of ships. The advantages are that all components fit perfectly and crews work with only one system, which has one set of controls. A further benefit is that you have a single point of contact for contract, installation and aftersales.

## General competence

Starting from a complete understanding of the ship's operational profile we can now optimize all the relevant components: engine, gearbox, shaft machine, propeller, nozzle, rudder, and propulsion control system – including speed setting, maneuvering and load control.

No matter how complex your needs are, we can customize a solution that delivers the best propulsive efficiencies and gives your ship a greener profile. We use MAN Alpha shafts and propellers, hybrid propulsion systems like the energy-saving MAN HyProp ECO. Under the MAN Cryo brand, we offer dual fuel propulsion and liquified natural gas (LNG) supply systems which reduce emissions, raise fuel efficiency and power density and keep operation economical.

## Key components

- **Main engines**  
Fuel-efficient, powerful and reliable four-stroke high and medium speed propulsion engines.
- **Auxiliary GenSets**  
Reliably deliver power at a low cost per kWh while respecting the environment.
- **Gear units**  
Together with our trusted affiliates, we offer a wide range of single and two-speed gearbox solutions for power take-off, power boost, take home and hybrid concepts.
- **Propellers**  
MAN Alpha propellers and propeller shafts result in more energy-efficient transport and a reduced impact on the environment. Kappel blades ensure utmost efficiency in hydrodynamics.

- **Propulsion control systems**  
The MAN Alphasonic 3000 propulsion control system optimizes the function of the complete propulsion train in terms of maneuverability and overall economy.
- **Nozzles**  
MAN Alpha nozzles can be customized to adjust the propeller thrust and pulling performance to the vessels' working patterns.
- **Engine automation**  
MAN SaCoS<sub>one</sub> combines all the functions of modern engine control in one system.

**MAN Energy Solutions**

86224 Augsburg, Germany

P + 49 821 322-0

F + 49 821 322-3382

info@man-es.com

www.man-es.com

All data provided in this document is non-binding. This data serves informational purposes only and is not guaranteed in any way. Depending on the subsequent specific individual projects, the relevant data may be subject to changes and will be assessed and determined individually for each project. This will depend on the particular characteristics of each individual project, especially specific site and operational conditions.

Copyright © MAN Energy Solutions.  
D2366605 Printed in Germany  
GGKM-AUG-18082