Dual-fuel conversion

MAN PrimeServ

For marine systems with two-stroke applications
Your existing engines, machinery, auxiliary systems, instrumentation and control systems might be aging, but that doesn’t mean they can’t keep delivering value. Our comprehensive, tailored retrofit solutions can bring your assets up to date and keep them there, through continuous development and modernization.

Available for a wide range of engines, propulsion systems and turbochargers, our retrofits and upgrades will help you improve efficiency, boost performance, save on fuel and lube oil, while lowering maintenance costs and enabling more flexible operation.

MAN PrimeServ retrofits will also help you comply with increasingly stringent environmental regulations and put your operations on the road to energy transition and decarbonization. And it will benefit your employees by improving crew safety, ease of equipment operation and lower emissions onboard.

To reduce emissions from diesel engines, consider our dual-fuel retrofit solutions in particular. In addition to improving environmental performance, these retrofits can help you save fuel and reduce operating costs.

Optimized equipment

Your partners for retrofit solutions

Reliability, greater efficiency and compliance with new environmental legislation are just some of the benefits our advanced retrofit solutions provide.
Increasingly strict limits on vessel emissions have given rise to new solutions for greener maritime operations. For example, gas has now become a truly viable bunker fuel option, paving the way for dual-fuel systems that meet environmental legislation and make good financial sense.

LNG, ethane, LPG and methanol fuels reduce air pollution significantly, while largely eliminating SO\textsubscript{x} and particulate emissions. A dual-fuel configuration now lets you switch between diesel and gas as prices change, making the dual-fuel approach more viable than ever.

Since any ME-C engine with a bore size of at least 50 can be converted for dual-fuel operation, more than 3,000 vessels can now run on LNG (ME-GI), ethane (ME-GIE), LPG (ME-LGIP), methanol (ME-LGIM) and other low-emission fuels.

**How a conversion works**

Prior to the conversion itself, the product scope is determined during an on-site survey, and the engineering, procurement and production work is started. Once the equipment has been shipped to the repair yard, MAN PrimeServ proceeds with the conversion working closely with shipyards around the world. Beside the engine conversion, the complete dual-fuel system consists of a fuel gas supply system (FGSS) and bunker tank(s) or integration into an existing cargo system. The MAN PrimeServ scope is not limited to conversion of the main engine but can also include the gas systems in partnership with MAN Cryo or other prominent gas system providers in the world.

In these cases, MAN PrimeServ can offer the conversion on a turnkey basis, taking full responsibility of the entire conversion project.

We provide a complete dual-fuel conversion package, including:

- Research and development
- Engineering
- Site survey
- Engine hardware
- Fuel gas supply system
- Installation supervision
- Testing and commissioning
- Project management

**The future is dual-fuel**
LNG or ethane

ME-GI/GIE engines enables you to operate on LNG (ME-GI) or ethane (ME-GIE), in addition to compliant conventional fuels.

The engine operates on the same principles as the conventional ME-C engine. It features the same operation profile and load response as the ME-C, and it’s designed to secure no ethane slippage and knocking problems.

To deliver efficient gas injection, an ME-GI/GIE engine requires the LNG/ethane to be vaporized and supplied at approximately 300 bar. In addition to the main engine retrofit, a gas valve train (GVT) has to be included with a fuel gas supply system (FGSS) that includes MAN Energy Solutions new developed PVU system.

From our experience with ME-GI/GIE new-buildings, we have extensive knowhow and a full range of solutions, all of which we apply to your retrofitting project.

Main engine conversion scope
- Cylinder covers with gas injectors
- Gas control blocks
- Gas chain pipes (high-pressure double-wall pipes)
- Sealing oil system
- Add-on ME-GI/GIE control system

ME-GI retrofit benefits
- Good environmental performance
- Lower NOx and CO2
- Removal of PM
- No SOx – 2020 compliant
- Positive impact on EEDI
- LNG supply chain at major hubs in place for 2020
LPG or methanol

ME-LGIP/LGIM engine runs on your choice of LPG (ME-LGIP) or methanol (ME-LGIM).

The ME-LGIP/LGIPM engines provide the electronic injection, operation profile and load response you know from your ME-C/ME-GI engines.

To provide efficient gas injection, ME-LGIP/LGIPM engines use fuel booster injection valves (FBIV) to pressurize the LPG/methanol liquid up to 500 bar, just like an ME-C engine. In addition to the main engine retrofit, a fuel valve train (FVT) and a FGSS can provide liquid fuels to the ME-C engines.

Thanks to favorable gas prices and availability, ME-LGIP/LGIPM engines are being used with increasing frequency.

Main engine conversion scope
- Cylinder covers with gas injectors (FBIV-P)
- Gas control blocks
- Gas chain pipes (high-pressure double-wall pipes)
- Sealing oil system
- Add-on ME-LGIP/LGIM control system

ME-LGIP retrofit benefits
- Great environmental performance, Lower NOx and CO2
- Removal of PM
- Positive impact on EEDI
- No SOx – 2020 compliant
- Supply chain in place worldwide (600–700 small LPG carriers in the market)
- Known LPG commodity prices available worldwide

ME-LGIP/LGIM engine runs on your choice of LPG (ME-LGIP) or methanol (ME-LGIM).
Pump vaporizer unit (PVU)

The PVU is designed to supply LNG/ethane to MAN B&W two-stroke ME-GI/GIE engines at the required pressure and temperature. It does so via a heat exchanger and hydraulic flow control. Fine particles present in the gas are filtered out before the gas enters engine, and 100% redundancy is ensured by separate control of three pump heads.

Compact, intelligent design and embedded redundancy enable the PVU to generate considerable saving throughout the FGSS. For example, one cylinder can be removed for overhauling while the other two continue to operate and supply 100% of required capacity. By comparison, traditional crankshaft-driven pumps require two complete units to provide system redundancy.

Engine gas pressure and flow demands are transferred quickly to the PVU, resulting in stable gas pressure control and efficient ramp-up and ramp-down in all operating conditions. In addition, the GVT downstream the PVU is controlled by the ME-GI engine control system, ensuring integrated control with the ME-GI engine.

The PVU is designed based on the same hydraulics and control principles used to control the ME-C engine’s combustion cycle. This ensures control integration between systems and accurate gas-supply control and condition-monitoring features. Moreover, the unit’s control system employs the same hardware platform as the ME engine control system, eliminating the need for extra spare parts.

The PVU is available for new-buildings as well as retrofits.

PVU main components
- Compact vaporizer heated by glycol water
- Electrical cabinet with 3 x MPC
- Pump strainer (standard 160my)
- NG filter after vaporizer (10my)
- Filter for glycol water (250my)
- Fully automated PVU control system including supervision of operational conditions

Benefits
- Low cost LNG/ethane PVU with embedded redundancy
- Automatically controlled and integrated in MAN-ES dual-fuel control system
- TBO cryogenic parts 6,000 running hours
- TBO hydraulic parts 32,000 running hours
- Compact design providing minimal footprint and low weight
- Worldwide service 24/7
MAN PrimeServ

Service with passion

MAN PrimeServ is the dedicated MAN Energy Solutions service brand. Via a network of over 100 service centers worldwide, MAN PrimeServ provides 24/7 service across the globe. Our range of services includes technical support, consulting and OEM spares, as well as maintenance, repair and comprehensive individualized service plans.

365 days a year

24 hours a day

MAN PrimeServ’s aim is to provide

- Prompt delivery of high-demand OEM spare parts within 24 hours
- Fast, reliable and competent customer support
- Individually tailored O&M contracts
- Ongoing training and qualification of operators and maintenance staff
- Global service, 24 hours a day, 365 days a year
- Diagnosis and troubleshooting with our high-performance Online Service

MAN Energy Solutions and legacy brands

MAN PrimeServ is our brand name for high-quality aftersales support for the entire MAN Energy Solutions product portfolio. Through refinements to our products and repair techniques, we ensure and enhance our technological leadership and technical expertise as an Original Equipment Manufacturer (OEM) for the brands united under MAN Energy Solutions.
Worldwide service

We offer retrofitting and upgrade services to bring engines and turbochargers already in service up to the very latest standards of performance and efficiency.

Represented in all key markets and major ports, with a network of more than 100 service centers, and with skilled field service managers at the ready to provide first-class technical support, MAN PrimeServ is fully primed to provide 24/7 service, wherever you are. In power plants, marine engines & systems and turbomachinery, offering reliable technical support when you need it most, our service solutions include OEM spare parts, engine and machinery maintenance and repairs, customized service agreements and individual consulting.

For existing equipment our holistic retrofit and modernization solutions keep your engines or turbochargers up-to-date and at optimal levels of reliability, availability and economic efficiency. Through cutting edge digital technology we’re able to hike performance and minimize downtimes, while our remote connections enable live data analysis, ensuring quick, effective solutions. MAN PrimeServ Academies provide expert training courses around the world, developing the operational and maintenance skills required.

For more information please visit www.man-es.com/services
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. Prinfotekroner, Printed in Denmark 1510-0297-00ppr