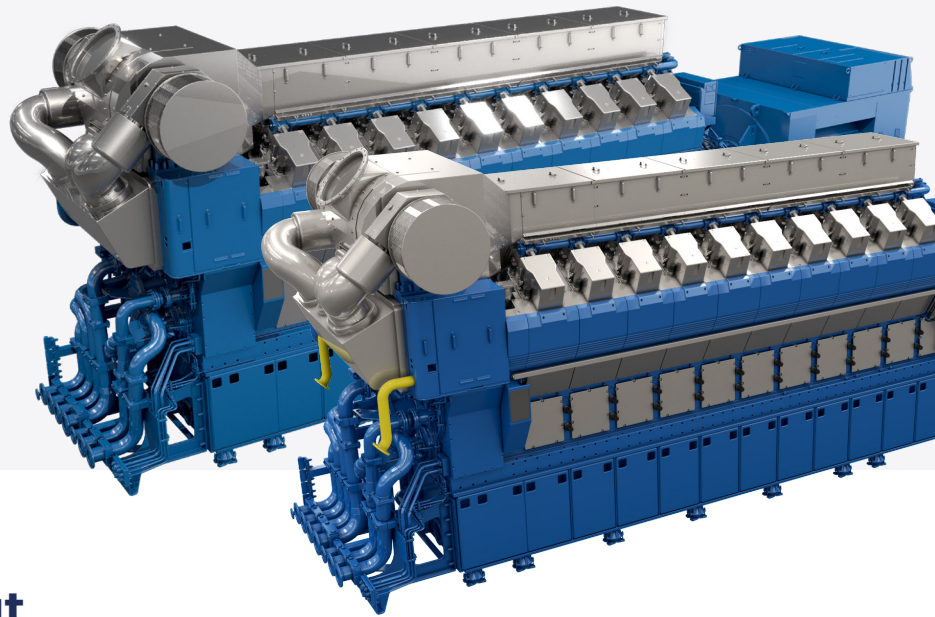


# B3X:45

Built for Today.  
Ready for Tomorrow.



## Fuel Flexibility Without Compromising Efficiency.

### Fuel Conversion Made Easy

With the latest Bergen engine series, it is now possible to convert between Bergen's liquid-fuel B33:45 to the lean-burn gas B36:45, keeping performance at its peak, without compromise.

The rapid changes toward a greener future make it difficult to predict changes to emission regulations, fuel prices, and fuel availability. Which fuel will you choose for your next project? With Bergen's modularized engine platform, you have the flexibility and peace of mind in your investment with future-proof solutions.

### Better than Dual-Fuel

Single-fuel reciprocating engines with fuel conversion capabilities are superior to dual fuel engines in several key areas.

#### Complexity and Maintenance

First, dual fuel engines are inherently more complex, requiring two separate fuel systems and sophisticated control mechanisms, which increases the likelihood of mechanical issues and requires more frequent or specialized maintenance. In contrast, single-fuel engines with conversion capabilities have a simpler design, reducing mechanical complexity and maintenance requirements, ultimately leading to lower operational costs.

#### Operational Flexibility

Operational flexibility is another advantage of single-fuel engines with conversion capability. Dual fuel engines, while able to switch between fuels, depend on the availability of both fuel types, which may not be practical in all situations. They are also more sensitive to fuel quality variations, affecting performance and efficiency. Single-fuel engines, however, can be converted from gas to liquid fuel (or vice versa) as needed, providing true adaptability to various fuel availability scenarios and ensuring consistent performance.

### Key Benefits

#### On Land.

- Flexibility for operators to adapt to future changes in emission regulations, fuel prices, and availability.
- Less complex than dual-fuel engines with only one fuel system; minimizes maintenance requirements
- Enhanced performance and efficiency
- Consistent performance, regardless of fuel availability

#### At Sea.

- Engines can be rebuilt on-board
- Other than the fuel system, the engine installation setup remains unchanged
- No need for steel cutting to do the rebuild
- Compliance with Emission Regulations



## Cost Efficiency

Dual fuel engines come with higher initial costs due to their complex design and require infrastructure to support two fuel types, leading to increased operating expenses. Conversely, single-fuel engines typically have lower upfront costs and minimized operational expenses since they run efficiently on the available fuel without needing dual support systems.

## Environmental Impact

Dual fuel engines face challenges in managing emissions due to the complexity of optimizing combustion for two different fuels, potentially leading to higher emissions. Single-fuel engines with conversion capabilities, however, can be optimized for emissions control based on the fuel in use, ensuring better environmental performance. The ability to switch entirely from one fuel to another allows for cleaner operation, and with Bergen's ongoing research in low-carbon future fuels for land and marine applications, emissions are set to reduce even further.

## A True Future-Proof Solution

As fuel technologies evolve, dual fuel engines may become less viable if one of the fuel types becomes less common or more expensive. Single-fuel engines, on the other hand, remain viable and efficient, regardless of shifts in fuel supply dynamics, ensuring that your investment is not only efficient today but also resilient to the changing energy landscape of tomorrow.

## How Does It Work?

Our latest engine series is based on a common platform for all fuel options and applications. The standardized modules are optimized so that the major parts are common for liquid fuel and gas - in fact, the engine block, crankshaft and foundation are identical.

If the operational environment changes, a fuel conversion can be done. These are typically our **Power Pack**, camshaft and exhaust manifold. This means that use of the existing maintenance area is sufficient. The connections to auxiliary equipment are standard for both fuel types, and the engine installation setup remains unchanged.

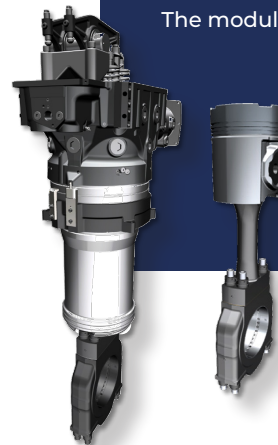
**With a modularized concept, and depending on the number of cylinders, our engines can be rebuilt for a different fuel type in less than four weeks.**

Additionally, many of the parts that are removed can be sold back to the Bergen Engines Worldwide Exchange Pool; an exchange pool of already overhauled components at fixed prices, with focus on the most labor-intensive parts, to save valuable time and money for our customers.

### Bergen Engines' Power Pack

Making service easy and cost-effective, while enabling fast major overhaul with minimum downtime.

The modularized design consists of a cylinder head, liner, piston and 3-piece connecting rod.



## Typical Applications

Although fuel conversion offers significant benefits across various applications, below are some key areas where we believe the technology can be particularly useful.

### ON LAND.

- **Mining** - often situated in remote areas, mining operations can start with diesel and transition to natural gas when infrastructure develops.
- **Hospitals or Healthcare Facilities** - If fuel supply is disrupted or is expected to become scarce, facilities that require reliable backup power can utilize our fuel flexibility.
- **Data Centers** - For fuel supply disruptions, data centers could benefit from fuel conversion in order to maintain operations.
- **Chemical or Food Processing Plants** - industries with fluctuating energy demands and varied fuel supply stability can benefit from this technology to optimize costs by switching fuels as prices fluctuate.
- **District Heating** - CHP systems and operations focused on longevity in the green transition can utilize natural gas today, and switch to any future fuel option as infrastructure and fuel supply becomes available.

### AT SEA.

- **Ferries & RoPax** - Using LNG in populated and environmentally-sensitive areas reduces emissions, and the fuel flexibility allows for an easy transition to future fuel sources as they become available.
- **Cruise** - With environmental stewardship and fuel availability in focus, cruise ships that require large amounts of power for propulsion and on-board amenities can benefit from fuel conversion for longevity of the vessel, and more flexibility in planning new routes typically dependent on refueling options.
- **Offshore Support Vessels (OSVs)** - Fuel conversion capabilities ensure continuous operation, even when fuel supply logistics are challenging. OSVs can also optimize their fuel costs by switching to the most economical fuel available.
- **Work boats** - Ensuring that operations continue uninterrupted by fuel supply variations, and the option to switch to cleaner fuels in sensitive areas helps comply with environmental regulations.
- **Fishing Vessels** - Commercial fishing vessels operating in remote areas are dependent on fuel availability, so the option to switch fuels can extend the operational range and life cycle of the vessel.