BERGEN ENGINES

ON LAND. AT SEA.

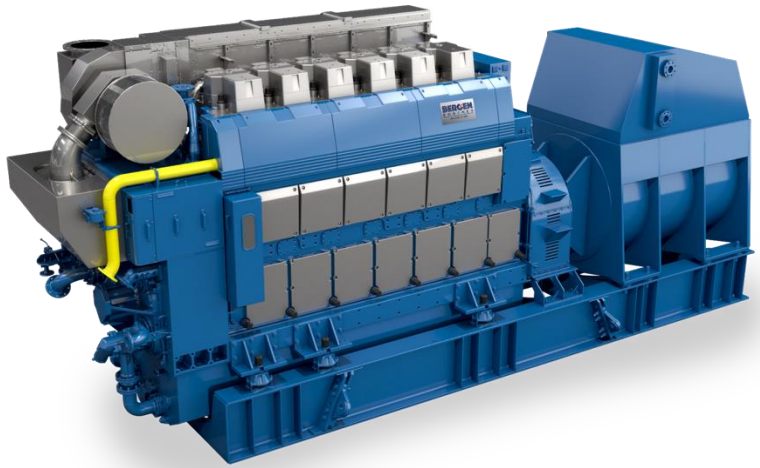
THE ROAD TO 100% HYDROGEN

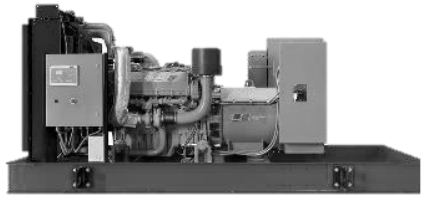
Solutions for a Sustainable Future

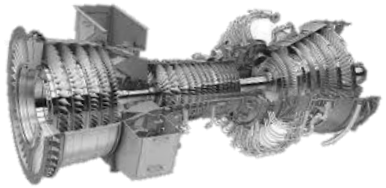
THEO LORENTZOS
Head of Sales, Americas

Medium Speed Engines

Speed refers to rpm







720 – 750 RPM | **1500 – 1800 RPM** | **3000 – 4000 RPM** | **10000 – 25000 RPM**

The Power of Medium Speed

720 – 750RPM, 3-12MW per unit

Reliable, Continuous Power in Cold Climates

High Efficiency, Lower Fuel Consumption

Durability & Long Operational Life

Lower Maintenance Costs & Longer Overhaul Intervals

Flexibility in Fuel Options

Flexibility in Fuel Options

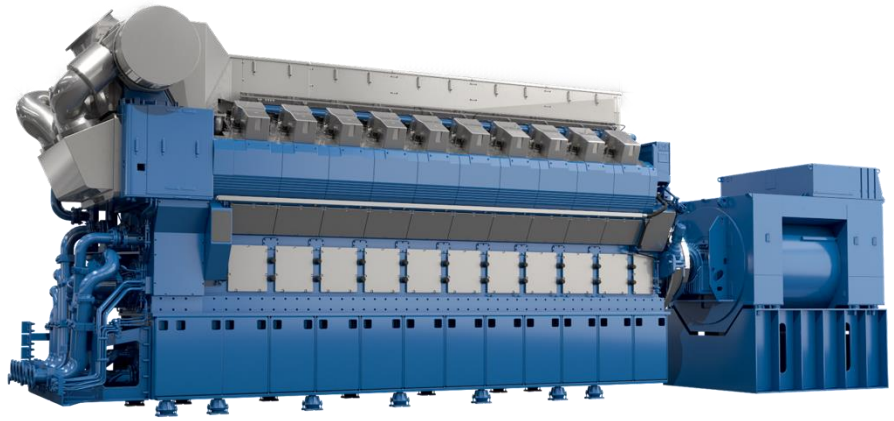
COMMON PLATFORM FOR ALL FUEL OPTIONS

Our latest engine series features a modular design so that major parts are common for liquid fuel and gas.

If your operational environment changes, a fuel conversion can be done using the existing maintenance area, with connections to auxiliary equipment remaining unchanged.

Better than Dual-Fuel

- Less complex with less maintenance requirements
- Operational flexibility
- Cost efficient
- Environmental Impact
- Future-proof solution



From Natural Gas to 100% Hydrogen

Natural gas has already helped us reduce emissions in many applications, but hydrogen takes us one step further towards zero-emission power.

Current commercialized offering is 25vol% blended hydrogen for natural gas engines. We're on-track to develop a 100% hydrogen engine by EOY 2024.

Leveraging Our Expertise in Natural Gas

- Adapting our trusted technology

2022 : Hydrogen Blending Without Hardware Adjustments

2023 : World's First 30% Hydrogen Blend at 100% Load

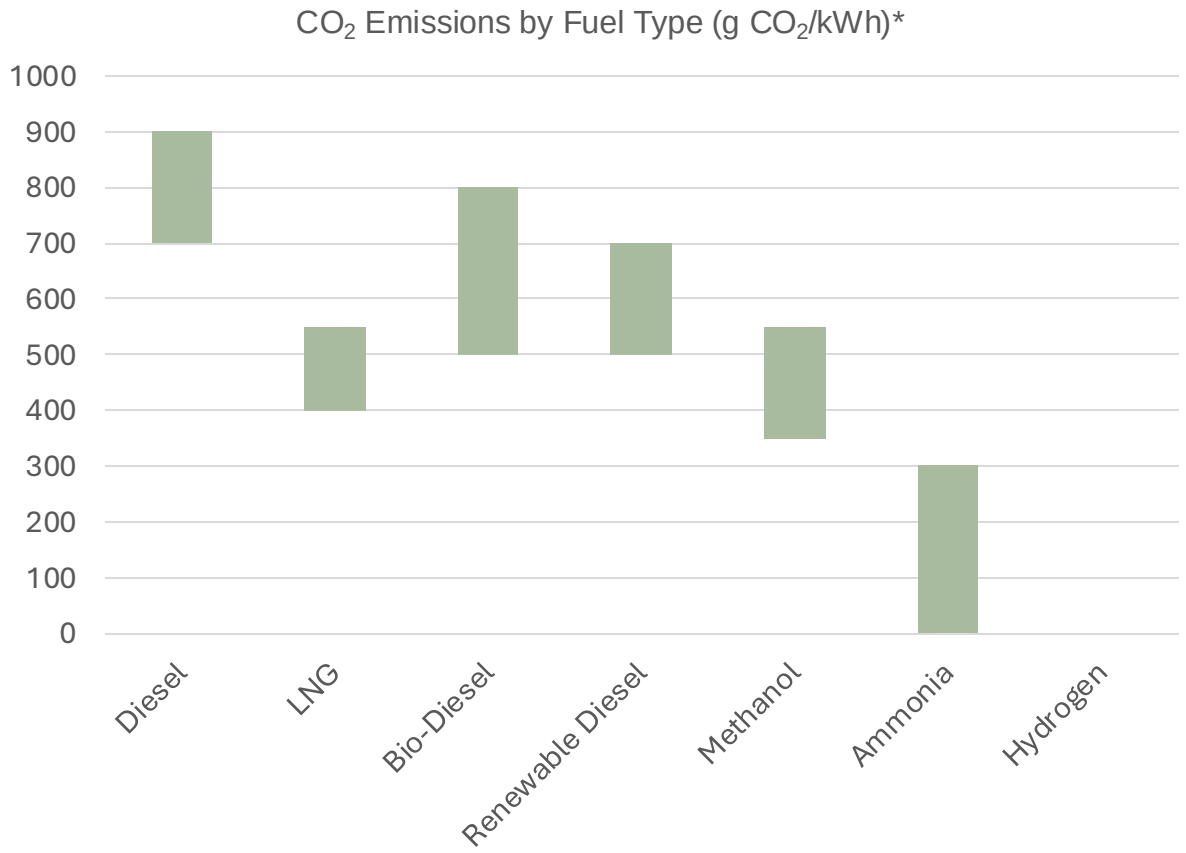
2024 : Testing Beyond 30% Hydrogen – On-track to Reach 100%.

Infrastructure Updates

Why Hydrogen?

Hydrogen; The cleanest fuel for a net-zero future.

- Zero CO_2 emissions
- Huge opportunity to decarbonize the industry
- In December 2023, Bergen Engines successfully achieved 30 vol% blended hydrogen test at 100% load – a world first.
- **Bergen Engines is working to develop a 100% hydrogen-fueled engine by EOY 2024.**



**Average in the industry; range of emissions depending on production methods and combustion.*

Challenges & Opportunities

Hydrogen in Mining Operations

Storage & Transport

Hydrogen, as a fuel, requires specialized storage and transport infrastructure.

Safety Concerns

Hydrogen is highly flammable, and its small molecules can easily leak through even tiny openings.

Infrastructure Limitations

Many mining sites are off-grid, which means they lack access to established hydrogen production or refueling stations.

Challenges & Opportunities

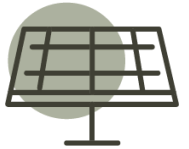
Hydrogen in Mining Operations

Clean, Scalable Power

With zero CO_2 emissions at the point of use, hydrogen-fueled engines could cut emissions drastically,

High Power Demands, Zero Emissions

With hydrogen, mining companies could achieve reductions in carbon emissions while still meeting power demands.



Integration with Renewable Energy

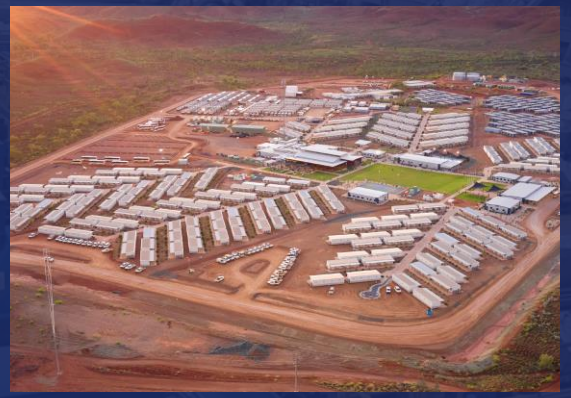
Hydrogen can be produced on-site using renewable electricity (from solar or wind) through electrolysis.

22MTPA of 67% Fe Magnetite

- *Contract Power / Fortescue Metals Group*
- *15 x 12MW gensets Bergen B36:45V20*
- *Pilbara, Western Australia*

Through the Pilbara Generation Project, the 170MW gas gensets are integrated with a 150MW solar photovoltaic farm and battery storage. The hybrid energy system is connected to a new transmission network Fortescue has built in the Pilbara, ensuring that the right amount of electricity is supplied in a reliable, efficient manner.

The gensets are designed for differing operational modes and can be used to generate baseload, peak power or operate in combined cycles; perfectly suited for remote locations with quick, frequent load changes. This joint venture between Fortescue's subsidiary FMG Iron Bridge and Formosa Steel IB is valued at $3.7 billion and is powered by Bergen Engines.



In Closing

- **Hydrogen-Powered Engines**:
  Our roadmap to 100% hydrogen-powered medium-speed engines supports mining operations' decarbonization goals.
- **Flexible, Off-grid Solutions:**
  Meeting power demands in remote mining locations with seamless scaling as the projects grow.
- **Partnering for a Low-Carbon Future**
  Dedicated to helping our customers toward decarbonization
- **A Future-Proof Solution**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