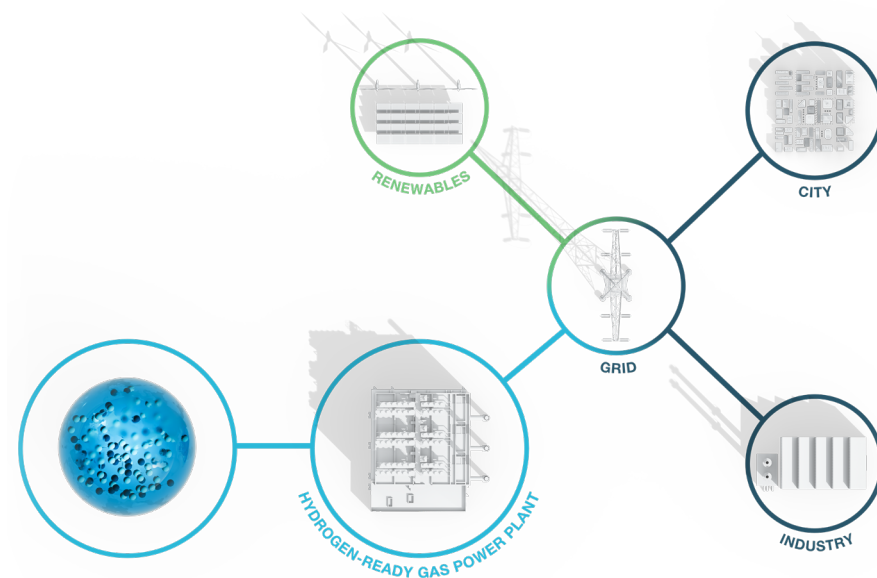


Future-proof power plants with hydrogen



Benefits at a glance

- Most efficient engines in the market > 51.5 %
- Very good part-load efficiency
- Combined heat and power (CHP) with efficiency greater than 90 %
- Stable power output, also in hot areas
- Multifuel capability (natural gas, bio gas, bio fuels, e-methane...)
- Hydrogen (H₂) ready
- Fast start-up times < 5 min
- Multiple starts and stops per day
- Continuous low-load operation down to 10 % load

Hydrogen basics

The energy sector is in a phase of rapid evolution where outcomes are uncertain. In times like this, being able to adapt to your circumstances – like a chameleon changing the color of its skin to match its surroundings – is a big advantage. For energy producers, the question is how to adapt to meet the challenges of decarbonization and the demand for decentralized, smaller, more flexible power plants that can balance renewable energies. We have a complete range of solutions for future-proofing power plants – and one key element is being ready for hydrogen.

General characteristics

Hydrogen is the lightest and most abundant element in the universe. It becomes a liquid at a temperature of -253°C and has the ability to diffuse into other materials, such as steel. While its volumetric energy density is relatively low, approximately 10.8 MJ/m^3 under standard conditions, it has a very high energy density by weight, reaching 120 MJ/kg . This makes hydrogen an efficient energy carrier in terms of mass, but its storage and transportation remain challenging, typically requiring very low temperatures, high pressures or specialized pipelines. Furthermore, hydrogen serves as a key feedstock for the production of other green fuels, such as ammonia (NH_3), e-methane, and methanol (MeOH).

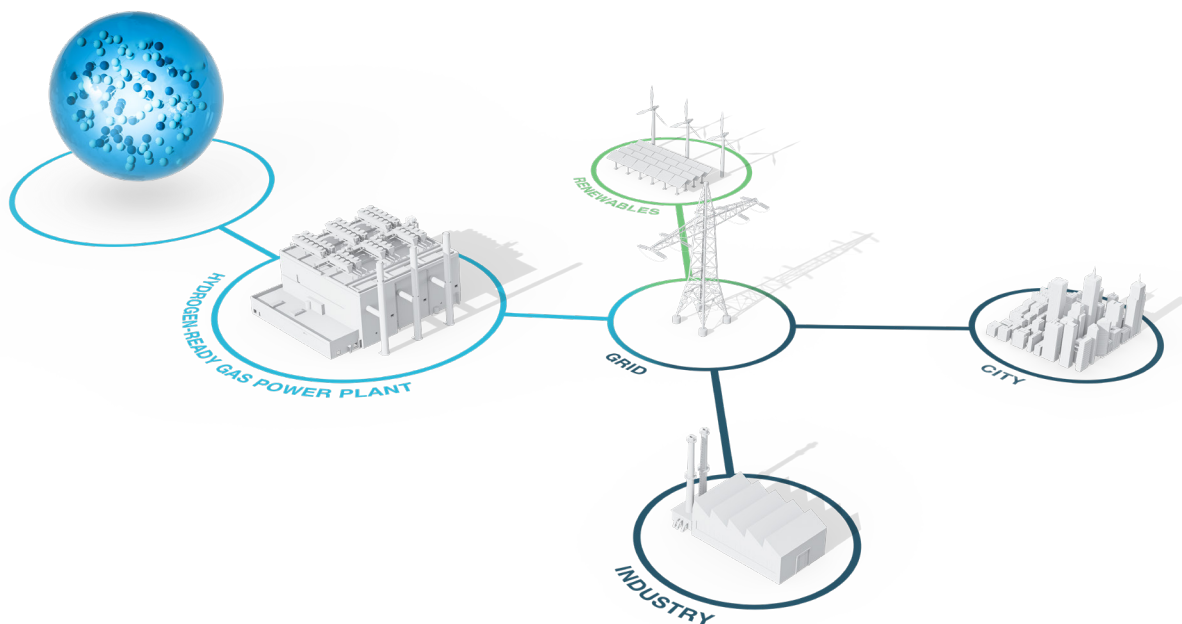
Advantages of using hydrogen in medium-speed engines

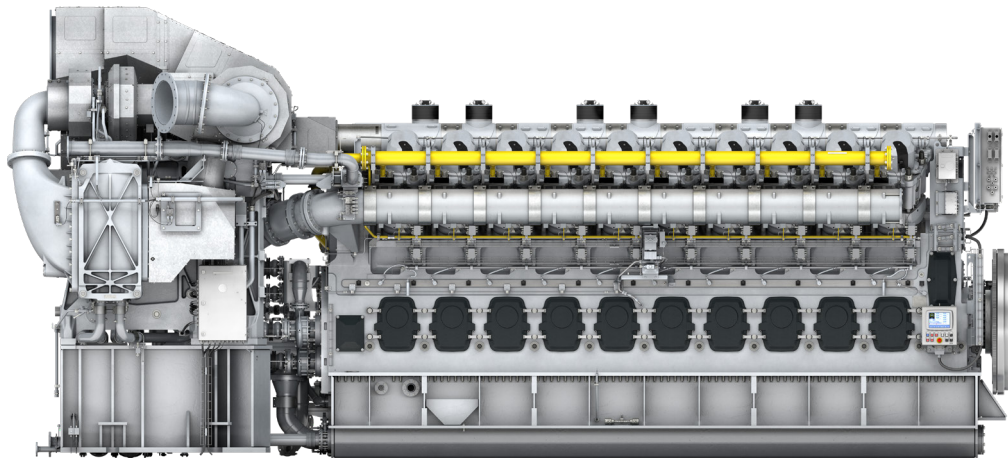
As a very clean fuel, hydrogen produces no carbon emissions, soot, or particulate matter. Modern engine technology is capable of efficiently burning even relatively low-grade hydrogen, which fuel cells cannot use, making it a versatile energy source. Flexible and reliable engine power plants running on 100 % hydrogen play a crucial role in achieving global net-zero CO_2 targets. Additionally, in the event of a hydrogen supply shortage, these power plants can seamlessly switch to natural gas as a backup fuel, ensuring continuous operation and energy security.

Impact of H_2 on combustion (compared to natural gas)

When operating with 25 % hydrogen, Everllence gas engines maintain a similar power output and efficiency compared to natural gas operation while achieving around a 9 % reduction in CO_2 emissions. NO_x emissions remain unchanged.

At 100 % hydrogen operation, power output reaches up to 90 % of the maximum continuous rating (MCR), with efficiency close to the level of natural gas. However, CO_2 emissions are completely eliminated, making it a zero-carbon solution, while NO_x emissions remain at a similar level to conventional operation.





**Highest
efficiency**



**Future
fuel ready**



**Lowest
emissions**



**Flexible and
reliable backup
for renewables**

Power generation with hydrogen

Our experience with hydrogen

We have extensive in-house testbed capacities dedicated to hydrogen research, enabling us to drive innovation in hydrogen engine technology. Since 2018, we have been conducting engine tests with hydrogen, accumulating over 1,000 testing hours on our testbeds. Our commitment to advancing hydrogen as a fuel is further reinforced by leading the R&D project HydroPoLEn, which is funded by the German Ministry for Economic Affairs and Climate Action and where we actively contribute to the development of sustainable energy solutions.

What is the difference between “hydrogen-ready” and “hydrogen-capable”?

A hydrogen-capable engine is designed to run on hydrogen from the very start, allowing for immediate use of this clean energy source. In contrast, a hydrogen-ready engine is initially operated with conventional fuels but can be retrofitted at a later stage to run on hydrogen, providing flexibility for future energy transitions.

Hydrogen in Everllence gas engines

Up to 25 % hydrogen-capable:

- 35/44G TS
- 51/60G (TS)
- Plant design

100 % hydrogen-ready:

- 35/44G TS
- Plant design

100 % hydrogen-capable:

- Planned from 2030
- Retrofit planned from 2032

Key applications

• Balancing renewable energy sources (RES)

Increasing shares of fluctuating RES require flexible, dispatchable backup, which is able to balance and stabilize the grid. A perfect solution for this backup is provided by Everllence gas power plants which can be converted to 100 % hydrogen operation once the hydrogen is available.

• Data centers

The data center industry is growing rapidly with a huge demand for power. Hydrogen-ready power solutions by Everllence offer a number of benefits when deployed to meet this demand, as they are reliable, sustainable, flexible, and efficient.

• Industrial parks

Many companies all over the globe are working to reduce the carbon footprint of their produced goods. This also includes the required power for their factories. The combination of RES and hydrogen-ready gas power plants from Everllence is a very attractive solution to provide low-carbon, yet highly reliable power.

Everllence

Everllence
86224 Augsburg, Germany
P + 49 821 322-0
info@everllence.com
www.everllence.com

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