METHANOL ● → REFORMER CH₃OH + H₂ → HYDROGEN ► → FUEL CELL → THERMAL ENERGY ⬍

AIR ► → → ELECTRICITY ⚡

What drives us?

Creating the first emission-free Lürssen yacht.

Always striving for innovative solutions, Lürssen has developed its first yacht with an integrated fuel cell system. The eco-friendly technology enables the yacht to anchor emission-free for 15 days or to cruise 1,000 miles at low speed. Lürssen is once again taking important steps to revolutionise modern shipbuilding.
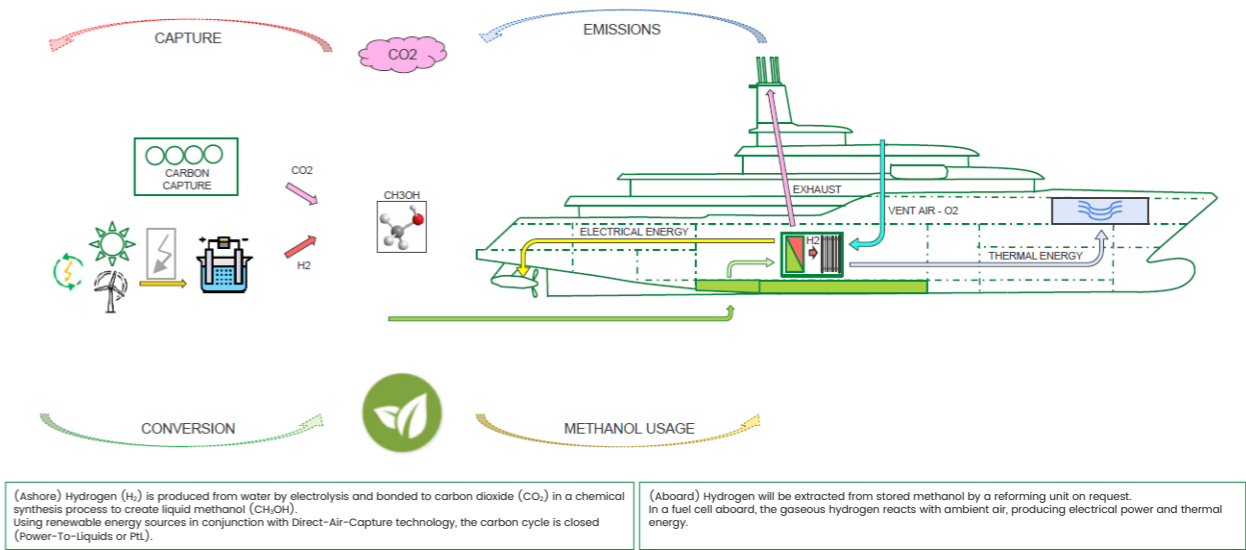
LÜRSSEN

The difference.

FUEL CELL TECHNOLOGY

The Lürssen Think Tank

Technical Whitepaper

LÜRSSEN

THE LÜRSSEN THINK TANK

We all see that the world of energy is changing, and the ethics of the traditional methods of energy production are being debated across all industries. The superyacht industry is a vital part of the evolution of this debate. At Lürssen, we believe that we have, as an industry, a chance to strive ahead. With the freedom in design from visionary owners, and the willingness to innovate, we can integrate ground-breaking technologies.

(Ashore) Hydrogen (H₂) is produced from water by electrolysis and bonded to carbon dioxide (CO₂) in a chemical synthesis process to create liquid methanol (CH₃OH).
Using renewable energy sources in conjunction with Direct-Air-Capture technology, the carbon cycle is closed (Power-To-Liquids or PtL).

(Aboard) Hydrogen will be extracted from stored methanol by a reforming unit on request.
In a fuel cell aboard, the gaseous hydrogen reacts with ambient air, producing electrical power and thermal energy.

FUEL CELL TECHNOLOGY

When considering the shift to green energy, it is vital to get the maximum energy from these systems as efficiently as possible. The hydrogen fuel cell has a long history of providing an efficient, sustainable solution across many varied applications. As well as the environmental considerations, an additional benefit of a fuel cell is that it is practically silent compared to a diesel engine, and the owner experience is greatly improved.

At Lürssen, we have been carefully examining and researching hydrogen fuel cells, along with our partners, since 2009. Cooperation, collaboration and integration are a vital part of the Lürssen brand, and our fuel cell development exemplifies this. We have committed to a strategic partnership with Freudenberg, one of the leading experts for maritime fuel cells. We both aim to bring fuel cells onboard ships in the near future and revolutionize the yacht's energy and propulsion system. We have built a state of the art innovation laboratory on site, and the first fuel cell will arrive this summer. Under real-life ambient conditions and with all required auxiliary systems, this demonstration plant will be the final preparation necessary to bring fuel cells onboard a yacht successfully.
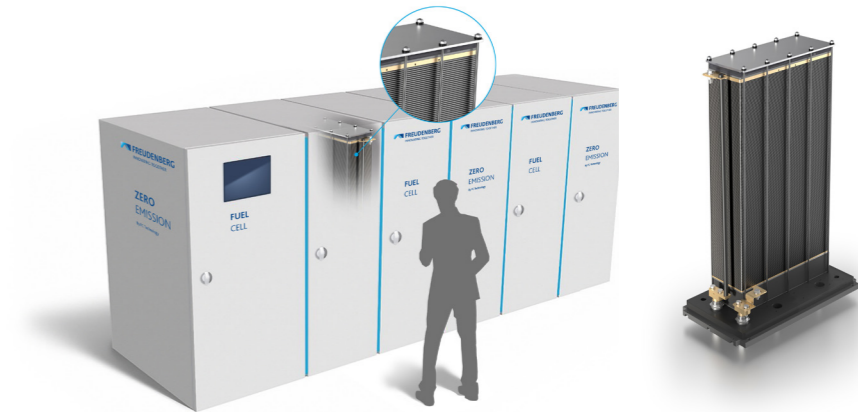
The challenge for a cleaner and more sustainable fuel system is that it needs to deliver on these promises without compromising the design and operational profile of a highly performing superyacht. Lürssen's and Freudenberg's concept is a fuel cell driven by hydrogen which is reformed from methanol on request. The choice of methanol rather than elemental hydrogen has been made due to its higher energy density, the simplicity of handling and easy world wide availability. The lighter energy density of methanol compared to diesel requires increased tank storage volume. Still, crucially, there is significantly less impact on the guest spaces, such as would be seen due to the installation of explosion proof areas and complex ventilation systems that gases such as elemental hydrogen and LNG require.

A greener energy source must be judged across the entire process, and methanol presents a solution that is already a bi-product of many other chemical reactions. Additionally, it can be produced using green energy such as solar. At Lürssen, these technologies are a part of every new build

discussion. We have pioneered the use of diesel-electric prolusion on our projects in the past. These early hybrid systems provide a model of innovation that we can follow to drive our next step, creating a new generation of Lürssen superyachts with sustainable propulsion solutions.

At Lürssen, we now have a pioneering, technology driven client for whom we are incorporating this history of technological development and research into a ground-breaking new-build superyacht. This revolutionary methanol-hydrogen powered vessel will be able to cruise at slow speeds for 1000 miles or spend 15 nights at anchor emission-free and silent. Customer and industry expectations for a sustainable yacht are growing; we will do everything we can to continue to lead the way ahead and make the dream of an emission-free yacht a reality.

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