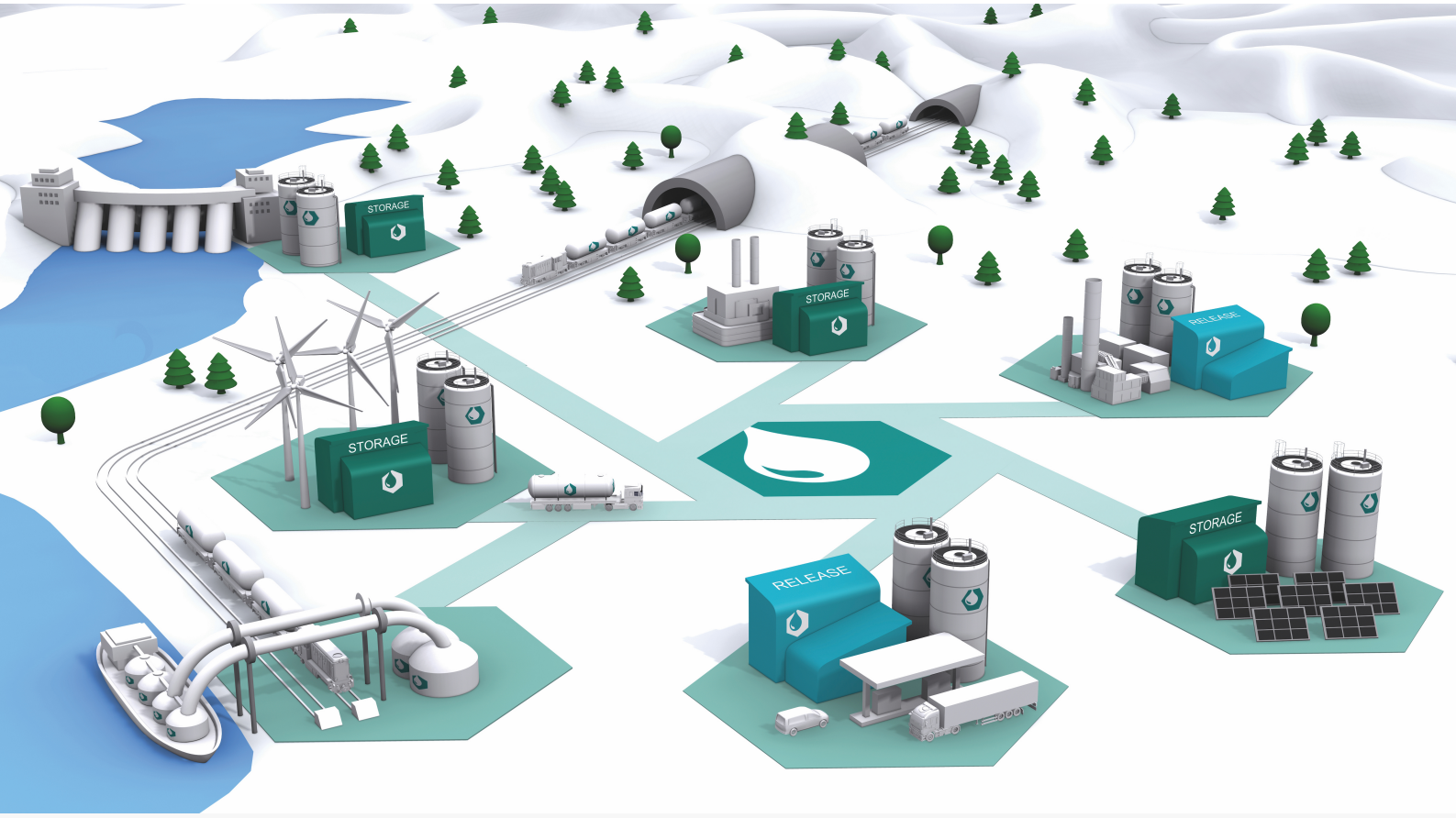


The oil trick with hydrogen

This article reflects the status at the time of its publication. The content may since have become outdated.

23/09/2021 Hydrogenious LOHC Technologies GmbH has developed a technology that binds highly volatile hydrogen gas with oil. This achievement led to the company being nominated for a 2021 German Entrepreneurial Award (Deutscher Gründerpreis). Porsche Consulting will be supporting Hydrogenious's efforts to further scale up its activities.

Green hydrogen is considered one of the most important components of the energy transition sought the world over. Generated via electrolysis from renewable energies like wind or solar power without emitting greenhouse gases, it will play an essential transformative role in many areas of the economy—from the steel industry to glass production. One challenge is how to make sufficient quantities of green hydrogen available in economically viable ways. A key role is therefore played by imports from regions such as Spain, the Middle East, Africa, and Australia. However, storage and transport of this highly volatile gas have thus far proved difficult. The Hydrogenious LOHC Technologies company, based in the northern Bavarian city of Erlangen, offers a solution: a process it has developed by which green hydrogen is bound to an oil. “Packed in oil,” the gas can be stored and transported under

ambient conditions. It is then released and the oil is reused for the next load.

The road to success was long. Dr. Daniel Teichmann, a chemical engineer, founded Hydrogenious LOHC Technologies GmbH in 2013. The four capital letters in the company's name stand for "liquid organic hydrogen carriers." Knowing that organic compounds can absorb and release hydrogen in chemical reactions, Teichmann arrived at the idea of using them to store and transport the gas. He refined this approach in the course of a research program at the Friedrich Alexander University Erlangen-Nürnberg (FAU). This southern German university has held a single-digit share of the spin-off since 2014. In return, it has transferred 15 patents to Hydrogenious. The high storage density of the LOHC process enables it to handle five times as much hydrogen as compression processes, for example. Teichmann found that a heat-transferring benzyltoluene oil is superbly suited for this purpose, and Hydrogenious has patented the process.

Dr. Andreas Lehmann, the company's head of strategy, highlights a potential trump card for commercializing the technology. "We can use all the infrastructure instruments that already exist for conventional fuels like diesel, including oil tankers, pumps, and tanker trucks." Moreover, the oil is exceedingly stable and secure because it can be handled and stored under normal conditions. It is not explosive or volatile, and emits no toxic corrosive vapors such as ammonia. The process is currently being tested at multiple demonstration facilities. The largest is planned for CHEMPARK in the town of Dormagen, with an anticipated storage capacity of five tons a day. "That means we've reached an industrial scale," Lehmann notes.

The managers of the Erlangen-based company are certain that not only industrial sectors but also "transport will benefit from hydrogen drive systems and therefore from our LOHC application." Lehmann goes on to explain that LOHC enables safe infrastructure for installations such as fueling stations. The process could also soon be used at sea. In July of this year the company, which now holds 45 patents and employs 125 people, entered a joint venture with the Scandinavian shipping enterprise Johannes Østensjø dy AS. The Hydrogenious LOHC Maritime AS joint subsidiary is expected to develop and market an innovative emission-free LOHC-based application for the shipping sector. The first freighter equipped with the novel technology "developed in Erlangen" could set off as early as 2024.

Investors are confident about the young technology experts' prospects. AP Ventures, the venture-capital management company for Anglo American Platinum, and South Africa's Public Investment Corporation, quickly came on board. They were followed by oil-terminal operator Vopak, the Winkelmann Group, the Mitsubishi corporation, the Covestro chemical group, and Hyundai Motor Company. In the latest round of funding, these six investors were joined by four more: Jera, Japan's largest power company, Temesek, the capital holding company for the government of Singapore, Chevron Oil Corporation, and the Pavilion Capital venture investor. "That gives our growth plans a very strong financial and strategic foundation," says Lehmann.

Hydrogenious's innovative power and pioneering technology were honored at this year's German Entrepreneurial Awards (Deutscher Gründerpreis). The jury, with representatives from DG's partners and sponsors including Stern magazine, the Sparkasse savings and loan institutions, ZDF television, and

Porsche, praised its development of a revolutionary storage and transport technology that can facilitate hydrogen's breakthrough as an energy vector in the 21st century. Hydrogenious was nominated in the "Up and Coming" category. Like the other finalists, it will receive four weeks of individual and customized attention by the Porsche Consulting management consultancy. "We want to work with the consultants to refine our strategy for the coming years as we transition from development work to a service and commercial enterprise," says Lehmann. "Porsche Consulting's ideas and experience in the mobility sector will be helpful, as will its consultants' expertise in bringing products and services onto the market." Michael Tribus, Senior Partner at Porsche Consulting, adds that "Hydrogenious commands precisely the technology that can make hydrogen a success. We want to help the company become an economic success as well."

German Entrepreneurial Awards—The Finalists

Since 2002, the German Entrepreneurial Awards (Deutscher Gründerpreis) have been honoring those who despite risks have not shied away from developing visions into business plans. And transforming ideas into companies. Alongside **Hydrogenious** LOHC Technologies GmbH, there are five more nominees in the "StartUp" and "Up and Coming" categories for the final round and awards ceremony on September 14 in Berlin.

WINNERS

Light and easy Making laboratory tests in microgravity simpler, faster, and more economical—on parabolic flights or on the International Space Station (ISS). Three aviation engineers, one industrial engineer, and their **Yuri**GmbH in the southern German town of Meckenbeuren have declared the "democratization of weightlessness" to be their business model. Yuri's core products are currently miniature labs that are sent into space for pharmaceutical companies or research institutes. Yuri's future plans are to make the transition from service provider to biotech company and to produce biological material or entire organs in space.

Wild and free The young **Wildling Shoes** GmbH company from the western German town of Engelskirchen wants to give feet as much freedom as possible. The use of Japanese washi fabric instead of leather is one reason the "barefoot summer shoes" by designers Anna and Ran Yona are so comfortable they're barely noticeable. The Yonas got the idea from their children, whom they allowed to run barefoot while living in Israel. The children later asked for shoes that would never constrict their feet—a wish shared by an ever increasing number of customers.

NOMINEES

Phishing prohibited Cologne-based **SoSafe** GmbH uses a training platform to help companies and organizations turn their employees into "human firewalls" in the fight against cyber crime. Around 3.4 billion phishing e-mails are sent every day, and more than 600 million of these evade spam filters. Half of them are opened. The three SoSafe founders and their team have developed an e-learning platform

with realistic simulations that raise employee awareness and thereby help to prevent online errors. Non-commercial users can try a free version at phish-test.de.

An app a day Treating anxiety disorders digitally via smartphone—this is what the Invirto app from Hamburg-based **Sympatient** GmbH promises. Developed by Julian Angern, a young neuroscientist, it puts virtual reality to use for psychotherapeutic purposes. Invirto requires a prescription and is approved by insurance companies. According to Sympatient, the treatment is now completely reimbursed by all public health insurance companies in Germany.

Your ID, please Confirming your identity online is now easier with the Selfie-Ident app from Hamburg-based **Nect** GmbH. Users take videos of their faces and ID cards. Artificial intelligence is used to verify the images quickly and easily on mobile end devices. Many insurance companies, Deutsche Telekom, the ADAC automobile association, and even the Bundesagentur für Arbeit (federal labor agency) are already using this customer-friendly process—for example, to promptly evaluate applications for unemployment benefits.

Info

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MEDIA ENQUIRIES



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Image Sublines

Path: The oil trick with hydrogen/Images/img_1.jpg
Title: Plans for a hydrogen release plant, 2021, Credit: Hydrogenious
Subline: Plans for a hydrogen release plant: 1.5 tons of hydrogen can be made available every day—at industrial sites or fueling stations. The system should be ready in 2024. Credit: Hydrogenious

Path: The oil trick with hydrogen/Images/img_2.jpg
Title: Hydrogenious is testing this small hydrogen release plant, 2021, Credit: Hydrogenious
Subline: Hydrogenious is testing this small hydrogen release plant at its headquarters. It fits in a container and will be used in a pilot project at an Erlangen gas station. Credit: Hydrogenious

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