Hydrogenious LOHC

Carrying the new energy world. Handling hydrogen as an oil.

We are a market-leading technology provider in hydrogen storage and transportation.

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Hydrogenious LOHC enables safe, efficient and flexible hydrogen storage and transport to consumers in industry and mobility across the globe. Our proven Liquid Organic Hydrogen Carrier technology is based on benzyltoluene as carrier medium (short: LOHC-BT) and can utilize conventional liquid-fuel infrastructure.

Founded in 2013, Hydrogenious LOHC focuses on the development of LOHC-BT technology for large-scale hydrogen transport and storage solutions. As technology provider, our portfolio includes consultancy, licensing and services along the value chain.

With our unique technology expertise and experience in realizing LOHC applications in various settings, we empower hydrogen producers and offtakers to build cost-efficient hydrogen trade routes.

Headquartered in Erlangen/Germany with around 120 employees and investors AP Ventures, Royal Vopak, Winkelmann Group, Mitsubishi Corporation, Covestro, JERA Americas, Temasek, Hyundai Motor Company, Chevron Technology Ventures, Paviliion Capital and Anglo American Platinum, we are a major enabler and accelerator for the energy transition.

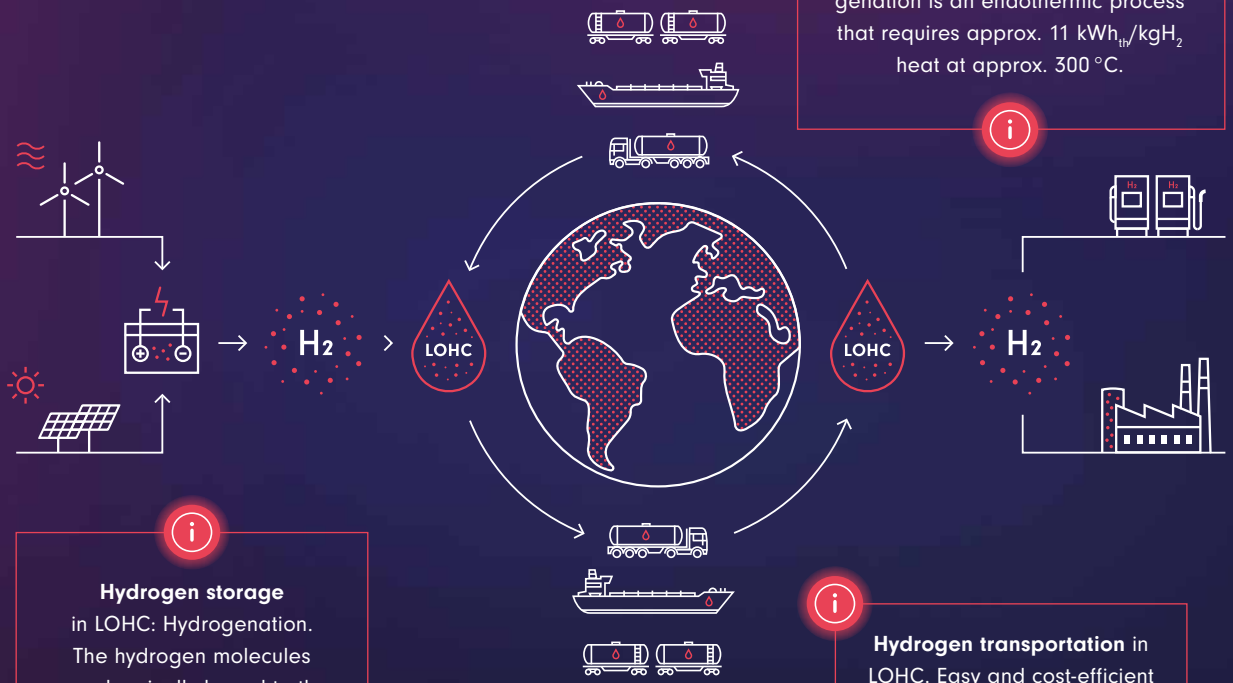
Hydrogenious LOHC Maritime

Hydrogenious LOHC Maritime, established as Joint Venture with Østensjø Group in 2021 and located in Norway, develops an emission-free on-board propulsion system with a promising LOHC/fuel cell solution for the global shipping industry.

The Hydrogenious LOHC management team (from left): Dr. Andreas Lehmann (Chief Executive Officer), Dr. Caspar Paetz (Chief Technology Officer), Dr. Daniel Teichmann (Executive Chairman of the Board of Directors) and Dr.-Ing. Stefan Bürkle (Chief Operating Officer)

We store hydrogen in a liquid organic carrier. The missing link to clean hydrogen supply chains.

Hydrogen release from LOHC: Dehydrogenation. The hydrogen molecules are chemically released from the LOHC via a catalytic reaction in a continuous process. The dehydrogenation is an endothermic process that requires approx. 11 kWh_{th}/kgH_2 heat at approx. 300 °C.



Hydrogen storage in LOHC: Hydrogenation. The hydrogen molecules are chemically bound to the LOHC via a catalytic reaction in a continuous process. The hydrogenation is an exothermic process generating approx. 9 kWh_{th}/kgH_2 heat at approx. 250 °C.

Hydrogen transportation in LOHC. Easy and cost-efficient logistics utilizing the existing infrastructure for fossil fuels via ship, barge, train or truck. The same applies to LOHC storage.

Our LOHC-BT technology is disrupting hydrogen infrastructure. By taming the lightest and highly explosive element.

Superior safety

> No handling of molecular hydrogen

> Hardly flammable with flash point 112.5 °C, non-explosive, even when loaded with hydrogen

> Hazard potential comparable to Diesel and thus clearly superior to ammonia

Enhanced flexibility

> Conventional liquid fuel infrastructure usable

> Handling at ambient temperatures and pressure during storage and transport

> No self-discharge over time – multi-month storage without losses

High efficiency

> Competitive volumetric storage density 54 kg hydrogen per m^3 LOHC

> More than 99.9 % hydrogen purity from the process without any purification

> Carrier material commercially available and reusable hundreds of times

We provide technology for stationary LOHC applications, optimized for scalability.

Storage

> Flexible industrial hydrogenation unit to match with renewables
> Direct coupling with steam methane reforming or large-scale electrolysis
> Can be combined with underground storage

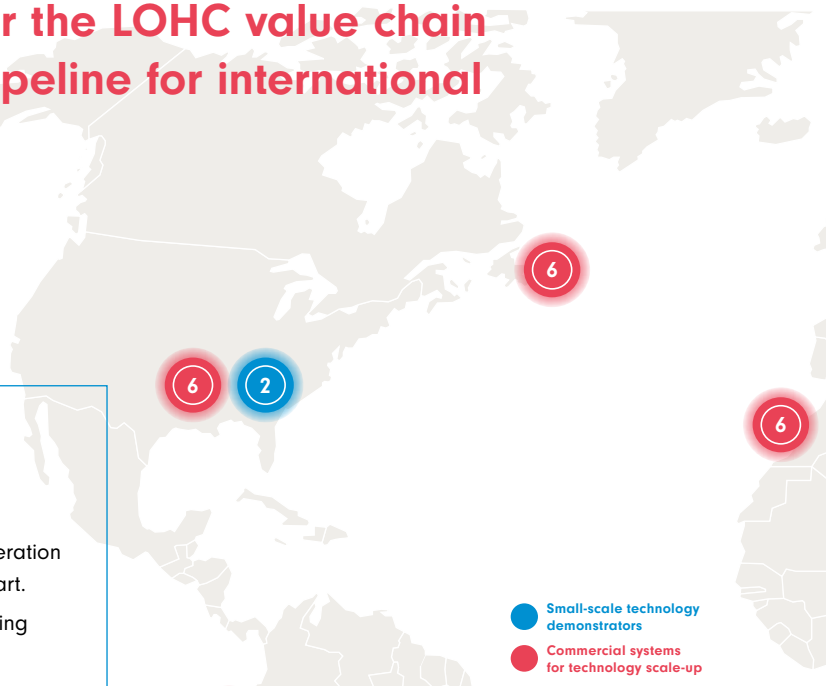
Release

> Industrial dehydrogenation unit designed for continuous and flexible operation
> Designed for coupling with hydrogen hubs and pipeline networks
> Can be combined with underground storage

Hydrogenation process	Exothermic reaction using a solid catalyst
Heat release	Approx. 9 $kWh_{th}/kg\,H_2$ at 200 – 250 °C for Storage Plant
Reaction pressure	Approx. 15 – 30 barg

Dehydrogenation process	Endothermic reaction using a solid catalyst
Heat demand	Approx. 11 $kWh_{th}/kg\,H_2$ at 250 – 330 °C for Storage Plant
Released hydrogen purity	More than 99.9% Fuel cell hydrogen quality (ISO-14687) with additional purification step
Reaction pressure	Approx. 1.5 – 3 barg

Strong proof points for the LOHC value chain support our project pipeline for international hydrogen supply.



1

First-of-its-kind small-scale systems demonstrate LOHC-BT's relevance and technological maturity

> First LOHC-BT-based hydrogen project in operation since June 2016 at the Fraunhofer IAO Stuttgart.

> World's first LOHC-BT-based hydrogen refueling station 2022. Successful implementation of a comprehensive LOHC value chain.

2

Go West 2016

> Two box systems for United Hydrogen to expand the local hydrogen supply radius.

3

HySTOC 2018

> Demonstration of cost-effective storage and transport of hydrogen stored in LOHC to a hydrogen refueling station.

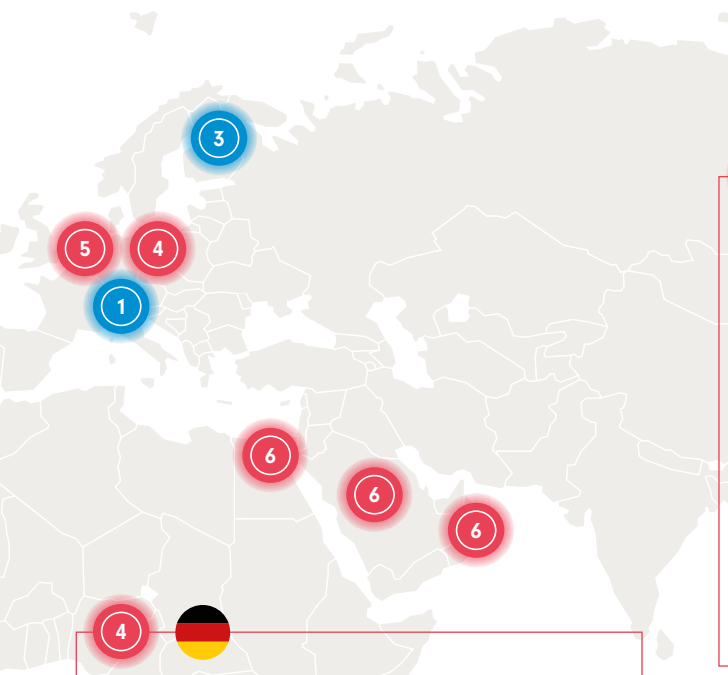
4

LOHC technology scale-up within Europe

> **One Reactor**
Unique reactor concept at Forschungszentrum Jülich to leverage the potential of LOHC-BT as energy storage medium: Storage and release of up to 100 tonnes of hydrogen per year from and in LOHC using one single reactor. Ready for operation in 2026.

> **Multi-SOFC demo project**
First-of-its-kind combination of hydrogen technologies for Hermann Josef Hospital Erkelenz: Bosch Multi-SOFC-system, supplied with hydrogen released from LOHC as of 2026.

Learn more about our projects:



4 LOHC Link: Combining two lighthouse projects to an end-to-end LOHC value chain

> **Project Hector**
Industrial plant for storing up to 1,800 tonnes of RFNBO hydrogen per year in LOHC at CHEMPARK Dormagen (Cologne, Germany). Hector will supply the Green Hydrogen @ Blue Danube Release Plant to establish a comprehensive LOHC link at industrial scale.

> **Green Hydrogen @ Blue Danube**
First LOHC hub in Central Europe with a hydrogen release capacity of up to 1,800 tonnes per year. This hub will supply industrial offtakers in the Danube region (Bavaria) and beyond with RFNBO hydrogen by 2028. Notified as IPCEI Hy2Infra project. National funding of €72.5 million received in July 2024.

5 Driving port evolution to become viable H_2 hubs

> **Royal Vopak at Port of Rotterdam**
Large-scale hydrogen imports based on LOHC-BT by ship via the Port of Rotterdam: Royal Vopak's IPCEI notified Release PLANT with a yearly hydrogen release capacity of several thousand tonnes using our proprietary LOHC technology.

> **H2A-RP at Port of Amsterdam**
Joint cross-border lighthouse project with Evos & Port of Amsterdam with the goal to install an industrial large-scale LOHC Release PLANT, aiming to import 36,000 tonnes of green hydrogen per year.

6 Enabling long-distance H_2 supply chains worldwide

> **North Africa**
Leveraging the region's huge potential for renewables and short distance to EU by participating in leading projects.

> **North America**
Cooperations with Chevron, Jera and Mitsubishi proving strong potential for hydrogen exports to EU.

> **Middle East**
Feasibility studies on large-scale LOHC plants and preparation of small scale pilots.

Let's build the new energy world together: Your key contacts.

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