

Press release

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Electricity and heat for Erkelenz hospital A showcase hydrogen project for tomorrow's energy supply

- ▶ Green light for publicly funded project under the consortium leadership of Forschungszentrum Jülich.
- ▶ Pilot system using Bosch solid oxide fuel cells being built at Hermann Josef Hospital in Erkelenz.
- ▶ Project partners testing innovative hydrogen technologies on an economically significant scale for the first time.

Erlangen / Erkelenz / Jülich / Stuttgart, Germany – Hermann Josef Hospital (HJK) in Erkelenz is hosting a showcase project for the climate-friendly energy supply of the future. Robert Bosch GmbH and Hydrogenious LOHC NRW GmbH are working at HJK to demonstrate the coupling of new hydrogen technologies on an economically relevant scale for the first time. This project is designed to drive forward the energy transition. It is one of several major research projects in the Rhenish mining area in western Germany expected to help make a success of structural change. The Helmholtz Hydrogen Cluster (HC-H2), based at Forschungszentrum Jülich, is coordinating this demonstration project.

Called Multi-SOFC, the project aims to deliver a significant reduction in carbon emissions and a more efficient energy supply for HJK. The partners are looking to demonstrate the innovative combination of two novel hydrogen technologies by the end of 2026, with a view to evaluating a more climate-friendly and ultimately less expensive solution. They will examine whether the Multi-SOFC project can meet half the hospital's base load. The demonstration project is intended to be a globally visible model for the future energy supply of large

buildings, and is being funded by Germany's Federal Ministry of Education and Research to the tune of 23.6 million euros.

SOFC system supplies hospital with electricity and heat

The Multi-SOFC project focuses on the [solid oxide fuel cell \(SOFC\) system](#) developed by Robert Bosch GmbH for supplying electricity and heat. In a subsequent expansion stage starting in early 2025, Hydrogenious LOHC NRW GmbH, a subsidiary of [Hydrogenious LOHC Technologies](#) in Erlangen, will supply the project with hydrogen by means of liquid organic hydrogen carrier (LOHC) technology. A pilot installation consisting of ten fuel-cell units with a performance range of 100 kilowatt will supplement the existing combined heat and power plant at the hospital in Erkelenz. It is the first pilot system of this scale to be installed by Bosch for regular operation. The system is scheduled to be commissioned in mid-2023. The hospital's full supply of energy is secure even without the new installations.

Cutting carbon emissions by 40 percent

In the first phase of the project, the SOFC system will run on natural gas. This already offers advantages in comparison with HJK's existing gas engine, which also runs on natural gas: the SOFC system achieves 60 percent electrical efficiency, while the gas engine achieves about 36 percent. As a result, SOFC systems emit almost 40 percent less CO₂ than gas engines when generating electricity from pure natural gas. Because it will be in continuous operation at the hospital, this means that even in its first stage, the project will already reduce carbon emissions by 150 metric tons per year. The heat generated when the natural gas is converted into electricity in the SOFC system will initially be used to heat the hospital. With this combination of electricity and heat, an SOFC system achieves an overall high level of efficiency at the beginning of its life cycle – around 85 percent. As the project proceeds, the partners plan to gradually increase the proportion of hydrogen in the gas mixture for the SOFC system – and thus achieve further reductions in carbon emissions.

Hydrogen from a carrier liquid for the SOFC system

Starting in 2025, the SOFC system will be supplied with hydrogen that has been chemically bonded to a liquid organic hydrogen carrier (LOHC): the hydrogen stored in the LOHC will be released in a dehydrogenation unit, to be installed on-site by Hydrogenious, and then fed into the fuel cell. This LOHC system will be ramped up using heat from the SOFC system, which in the future will also provide the energy needed for the reaction to release the hydrogen from the LOHC. Until then, the system will be heated electrically.

The project in Erkelenz is the first of several demonstrators that the [HC-H2](#) is coordinating in the Rhenish mining area. This Helmholtz cluster comprises the [Institute for Sustainable Hydrogen Economy \(INW\)](#), which was founded in 2021 at Forschungszentrum Jülich, and its project partners from industry, business, research, and the local authorities. The HC-H2 wants to use the Rhenish mining area to demonstrate novel climate-friendly hydrogen storage technologies that can be applied worldwide. Its second main goal is to create new jobs and inject new strength into the mining area's economy to compensate for the phaseout of lignite, which will take place by 2030.

Additional information: the advantages of Hydrogenious LOHC technology

The LOHC technology that Hydrogenious LOHC NRW is installing in Erkelenz is an innovative solution for the particularly safe storage and efficient transportation of hydrogen. Hydrogenious's specific LOHC technology bonds hydrogen to benzyl toluene – a thermal oil that can be easily and safely handled at ambient pressure and temperature. Even when loaded with hydrogen, this LOHC will not readily ignite and is non-explosive, making it ideal for use at HJK, among other applications. Furthermore, there is no “boil-off” from the LOHC, meaning it loses no hydrogen over time. Alternative methods – such as high-pressure compression or liquefying the hydrogen by cooling it to minus 253 degrees Celsius – are comparatively energy-intensive and require more effort to prevent hydrogen loss and ensure system safety.

What the project partners say:

Jann Habbinga, Administrative Director of Hermann Josef Hospital Erkelenz

“Our hospital's clinical operations consistently consume at least 92 kilowatts of electricity and 220 kilowatts of heat per year. Because we operate around the clock, we have a constant level of demand, which was a key point for the project. We feel it's important to help develop hydrogen technologies, and we're very pleased to be a part of this innovation project.”

Dr. Wilfried Kölscheid, Senior Vice President at Bosch and responsible for the stationary solid-oxide fuel-cell program:

“Having a decentralized power supply is becoming increasingly essential. Our solid oxide fuel cell system generates electricity in a climate-friendly and demand-driven manner. This is our way of securing the supply for critical infrastructure such as hospitals and playing an important part in climate action. The project in Erkelenz is a great opportunity to use our SOFC system in the infrastructure of a hospital for the first time, and will later demonstrate the benefits of using the system in combination with an LOHC system.”

Prof. Peter Wasserscheid, spokesman of the Helmholtz Hydrogen Cluster HC-H2:

“Multi-SOFC is our first demonstration project. We’re proud that we’ve managed to get this far just 15 months after our founding. We’re growing not only at our headquarters in the Brainergy Park in Jülich, but also with our demonstration projects in the Rhenish mining area. The project is an important milestone because, together with our partners, we’re demonstrating for the first time on a large scale a technology that can be a global solution for climate-friendly energy supply to large building complexes.”

Dr. Caspar Paetz, Chief Technology Officer at Hydrogenious LOHC Technologies:

“As a pioneer in the field of liquid organic hydrogen carriers, it’s crucial for us to demonstrate the potential synergy effects in practice. The project in Erkelenz is impressive proof of the huge potential that lies in combining innovative hydrogen technologies. At the same time, it’s a wonderful opportunity for us to demonstrate climate-friendly energy supply in North Rhine-Westphalia. We’ve shown our willingness to make a sustainable commitment to the region not least through the establishment of our subsidiary Hydrogenious LOHC NRW GmbH.”

Press photos: #d68eb6d8; #b71230f7; #41adaaef

Contact person for press inquiries (Bosch):

Dörthe Warnk

Phone: +49 711 811-55508

E-mail: doerthe.warnk@bosch.com

Contact person for press inquiries (Forschungszentrum Jülich):

Guido Jansen

Phone: +49 2461-61-5562

E-mail: g.jansen@fz-juelich.de

Contact person for press inquiries (Hydrogenious LOHC):

Frank Erik Walter

Phone: +49 171 713-4012

E-mail: frank.walter@hydrogenious.net

The Bosch Group is a leading global supplier of technology and services. It employs roughly 420,000 associates worldwide (as of December 31, 2022). According to preliminary figures, the company generated sales of 88.4 billion euros in 2022. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT provider, Bosch offers innovative solutions for smart homes, Industry 4.0, and connected mobility. Bosch is pursuing a vision of mobility that is sustainable, safe, and exciting. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to facilitate connected living with products and solutions that either contain artificial intelligence (AI) or have been developed or manufactured with its help. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life." The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiary and regional companies in some 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. With its more than 400 locations worldwide, the Bosch Group has been carbon neutral since the first quarter of 2020. The basis for the company's future growth is its innovative strength. At 128 locations across the globe, Bosch employs some 85,000 associates in research and development, of which nearly 44,000 are software engineers.

The company was set up in Stuttgart in 1886 by Robert Bosch (1861–1942) as "Workshop for Precision Mechanics and Electrical Engineering." The special ownership structure of Robert Bosch GmbH guarantees the entrepreneurial freedom of the Bosch Group, making it possible for the company to plan over the long term and to undertake significant upfront investments in the safeguarding of its future. Ninety-four percent of the share capital of Robert Bosch GmbH is held by Robert Bosch Stiftung GmbH, a charitable foundation. The remaining shares are held by Robert Bosch GmbH and by a corporation owned by the Bosch family. The majority of voting rights are held by Robert Bosch Industrietreuhand KG, an industrial trust. The entrepreneurial ownership functions are carried out by the trust.

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