

FRAUNHOFER IWU

PRESS RELEASE

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Hydrogen Microgrids Make Sun and Wind Storable

More specifically, they store electricity generated from solar and wind power in the form of hydrogen (electrolysis) – for extended periods if needed. "Storable" green electricity would be a significant advancement: Today, unused electricity is sometimes given away to neighboring countries on weekends to prevent overloads in the power grid. Conversely, as autonomous energy networks in a compact format, microgrids bridge periods of low energy production, known as "dark doldrums," when there is no wind or sunshine. Fuel cells in the grid then convert the stored hydrogen back into electricity. Thus, these grids are ideally suited for local energy networks and can fit into offshore containers.

Compared to battery storage, hydrogen storage has the advantage of being able to store large amounts of energy – even for extended periods if necessary. Unlike batteries, which lose charge over time, hydrogen has very low self-discharge, making it well-suited for seasonal energy storage.

Where Hydrogen Microgrids Make Most Sense in Germany: Hospitals and Sports Centers. Ambitious Industry Partners Welcome! HyGrid for the Reconstruction of Ukraine

In Germany, H2 microgrids are becoming an increasingly attractive option for decentralized energy supply and beyond. For instance, the Reference Factory.H2 from Fraunhofer IWU has developed initial concepts for sports centers. Hospitals are also among those who could exploit the full potential of such a microgrid due to a side effect of electrolysis: the oxygen produced could be used as technical oxygen or for cleaning and disinfecting water.

At Hannover Messe, the Reference Factory.H2 will showcase the H2 microgrid platform HyGrid. The core component is the HyVentus electrolyzer developed by the Reference Factory H2. HyVentus, an innovative, cost-effective solution, is now being produced by a consortium of industrial partners, including Aumann Limbach-Oberfrohna GmbH, Linamar Antriebstechnik GmbH, Haver & Boecker OHG, Capgemini Engineering, and TISORA Sondermaschinen GmbH.

The Reference Factory.H2 aims to establish further strategic partnerships with ambitious companies looking to harness the potential of compact microgrids. Siemens AG has joined the Reference Factory.H2 as a partner for automation solutions. The common goal is to

Contact

Andreas Hemmerle | Fraunhofer IWU | Phone +49 371 5397-1372 |
Reichenhainer Straße 88 | 09126 Chemnitz | Germany | www.iwu.fraunhofer.de | andreas.hemmerle@iwu.fraunhofer.de |

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shape a value-creation community that implements a robust, efficient solution with significantly reduced manufacturing costs. Innovation and standardization will open up a variety of application scenarios.

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With HyGrid, the Fraunhofer Society promotes a cost-effective and robust microgrid. As a scaled plug-and-play solution. In war-torn regions and elsewhere, HyGrid can cover a range from a few to several hundred kilowatts – ideal for hospitals, businesses, schools, or remote rural areas. The core task of HyGrid in Ukraine is to store renewable energy for power supply in the upcoming winter.

The team at the Reference Factory.H2 already has solid experience with H2 microgrids under special conditions. The connection to HyTrA, the H2 microgrid in Cape Town, South Africa, will provide Messe visitors in Hannover with insights into the operation of such solutions and demonstrate ways for remote monitoring and maintenance.

HyTrA - Hydrogen Tryout Areal in Cape Town, South Africa

The Hydrogen Tryout Areal, funded by the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), is ideally suited to demonstrate the effectiveness of hydrogen for a stable, climate-neutral energy supply. Especially for regions with more renewable energy than is needed for their own consumption, HyTrA offers attractive export opportunities for hydrogen alongside self-use.

The microgrid conceived for HyTrA went into operation in mid-2023 at Alu-Cab in Cape Town. Alu-Cab is a manufacturer of car roof tents and accessories. The company already had photovoltaic systems at the site and can now use excess energy to produce, store, and convert hydrogen back into electricity on-site when needed. This flexibility secures production at the company with a stable power supply and makes it independent of fluctuations in the public grid.

The microgrid developed under HyTrA is perfectly adapted to the specific requirements of the African market and boasts a lifespan of over 60,000 operating hours (more than 10 years), making it a robust solution. It is based entirely on renewable energy and can also cover off-grid or hard-to-access areas. HyTrA also promotes the development of regional supply chains; the project also facilitates German companies in entering the African market.

Hydrogen & Oxygen for Power Supply and Water Treatment in Namibia

With HyGO, another groundbreaking hydrogen project is on the horizon. The project, also funded by the BMUV, will be implemented in the Erongo district and will utilize the oxygen generated during electrolysis in addition to the functionalities of the HyTrA system – to

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treat wastewater to rainwater quality and for irrigation purposes. The microgrid is currently under construction at Fraunhofer IWU.

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HyTrA and HyGO receive funding from the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety, and Consumer Protection.



Fig. 1 Hydrogen-based microgrids are perfect for establishing decentralized power networks with renewable energies
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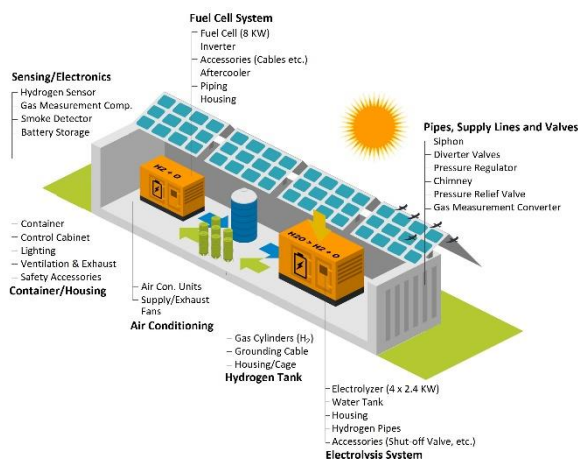


Fig. 2 Structure and core components of a microgrid
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The **Fraunhofer Institute for Machine Tools and Forming Technology IWU** is an innovation-driven partner for research and development in production engineering. Around 670 highly qualified employees work at our locations in Chemnitz, Cottbus, Dresden, Leipzig, Wolfsburg, and Zittau. We unlock potential for competitive manufacturing, across industries like automotive, aerospace, electrical engineering, and precision engineering. Our research and contract research encompass the entire manufacturing ecosystem, from individual components to processes, methods, complex machine systems and human interaction. As one of the leading institutes for resource-efficient manufacturing, we bank on highly flexible, scalable cognitive production systems using nature as an example. We take a holistic approach to the entire process chain, aligning with circular economy principles. We develop technologies and intelligent production plants and optimize forming, cutting, and joining manufacturing steps. Our services include innovative lightweight structures and technologies for processing new materials, functional transfer to assembly groups, and the latest technologies of additive manufacturing (3D printing). We provide solutions for climate-neutral factory operations and large-scale production of hydrogen systems, thus paving the way for the transition to renewable energies.