FRAUNHOFER IWU

PRESS RELEASE

New 80 kW test bench strengthens hydrogen infrastructure in Saxony

Fuel cells convert hydrogen into electrical energy, providing a locally CO_2-free power source for heavy-duty trucks, rail vehicles, ships, automobiles, and aircraft. Starting in October 2025, Fraunhofer IWU will be able to thoroughly test fuel cells and fuel cell systems on behalf of its industrial clients and project partners. The purpose of such testing is to characterize and evaluate performance, durability, reliability, and other critical properties under various operating conditions. Also under scrutiny will be essential components like cooling units, water separators, pumps, sensors, humidifiers, and heat exchangers. The team led by Dr. Carmen Meuser has a clear goal: to accelerate the ramp-up of fuel cell manufacturing.

Key Element of H_2 Infrastructure: Strengthening Manufacturing Technologies

As hydrogen infrastructure grows in and around Chemnitz, Fraunhofer IWU is focusing on manufacturing technologies. Through its initiative *Referenzfabrik.H2*, it leads a value-creation network of Fraunhofer institutes and companies that are optimizing production processes for electrolyzers and fuel cells. It's all about making hydrogen systems suitable for large-scale production via reduced manufacturing costs, paving the way for a market breakthrough for these vital hydrogen systems.

Certified Lab, Large-Scale Test Bench, and Design for Manufacturing

Test benches are not only used to verify manufacturing outcomes—they also help validate material concepts before a product enters series production. This so-called *Design for Manufacturing* connects quality assurance with material analysis to lower production costs and improve product functionality. An early alignment of materials and production strategy is crucial, especially for the rapid industrial scaling of hydrogen systems.

Meuser's team will use the 80-kW test bench for fuel cell systems to inspect manufacturing results. Testing semi-finished products—not just completed stacks (fuel cell stacks)—is a critical contribution to quality assurance and the efficiency and lifespan of these systems. For example, impedance measurements (to assess internal resistance within a fuel cell system) underpin fault analysis and aging diagnostics.

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To support extensive testing programs in line with EU regulations ("harmonized standards"), U.S. guidelines ("Department of Energy Technical Standards," DoE), or individual customer requirements, more than just a test bench is available. A certified laboratory—accredited under Section 15 of the German Operational Safety Ordinance—has been established. Both the test bench and testing chamber are relatively large, allowing for the evaluation of 80-kW modules, including balance-of-plant components such as cooling units, water separators, pumps, sensors, humidifiers, and heat exchangers.

Test Infrastructure Expansion at IWU Sites in Chemnitz and Görlitz

Additional test benches will be added to the hydrogen testing lab at Fraunhofer IWU Chemnitz in the fall of 2025. These include a 250-W fuel cell test bench for characterizing individual components and a 1-kW electrolyzer test bench for mini-stacks (component-level characterization). These test benches will also support impedance measurements and feature a cyclic voltammetry unit to assess the condition of catalyst surfaces. This feature enables the analysis of whether any observed damage is reversible or permanent and also allows the evaluation of new materials—especially relevant for replacing costly or rare materials, which is of particular interest to manufacturers.

At the same time, the Fraunhofer IWU hydrogen team is working intensively on the development of the *Hydrogen Lab Görlitz (HLG)*, which will focus on hydrogen production and storage. A key method for producing hydrogen is electrolysis, which splits water into hydrogen and oxygen. The HLG will feature test benches for electrolyzers in various power classes up to 2 MW. These test benches will allow for the simulation of mechanical loads, such as replicating wave conditions for offshore electrolysis. A climate chamber is also planned as a testing environment, enabling the simulation of ambient temperatures from -30 °C to +70 °C with adjustable humidity levels. Furthermore, they aim to standardize electrolyzer performance evaluation, assess performance depending on operating and material parameters, and simulate aging processes.

About the Hydrogen Region of Chemnitz

The Chemnitz region has emerged as one of the leading European centers for hydrogen research. The backbone of the local hydrogen ecosystem includes the Chemnitz University of Technology, the Fraunhofer Institutes IWU and ENAS, and the future *Hydrogen Innovation Center (HIC)*—one of four hydrogen innovation and technology centers in Germany. Chemnitz University of Technology focuses its hydrogen research on production, storage, and transport, as well as on applications in mobility, energy systems, and industrial processes.
Fraunhofer IWU, Fraunhofer ENAS, and industry partners are collaborating closely to develop scalable, high-efficiency hydrogen systems and support the growth of a sustainable hydrogen economy.
The HIC will contribute to the local hydrogen infrastructure by offering testing, certification, training, and education services. It will dispose of rental H_2 laboratories and workshops. All stakeholders are part of the HIC partner network, coordinated by the *HZwo e.V.* hydrogen technology cluster.

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SAB

The fuel cell test bench at Fraunhofer IWU received funding from the Saxon Development Bank and the EU project "Clean Energy City" to promote hydrogen technologies as alternatives to fossil energy sources. A further project partner in "Clean Energy City" is Chemnitz University of Technology.

Fig. 1 Open design, generously sized, and suitable for a wide range of uses: The IWU will use its test bench primarily to evaluate the quality and functionality of fuel cells during production. The test bench has an output of 80 kW, with a source/sink of 800A.
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Fig. 2 Compact yet complete: The reverse osmosis unit that supplies ultrapure water for humidifying the fuel cell system during testing (Photo: Dr. Carmen Meuser).
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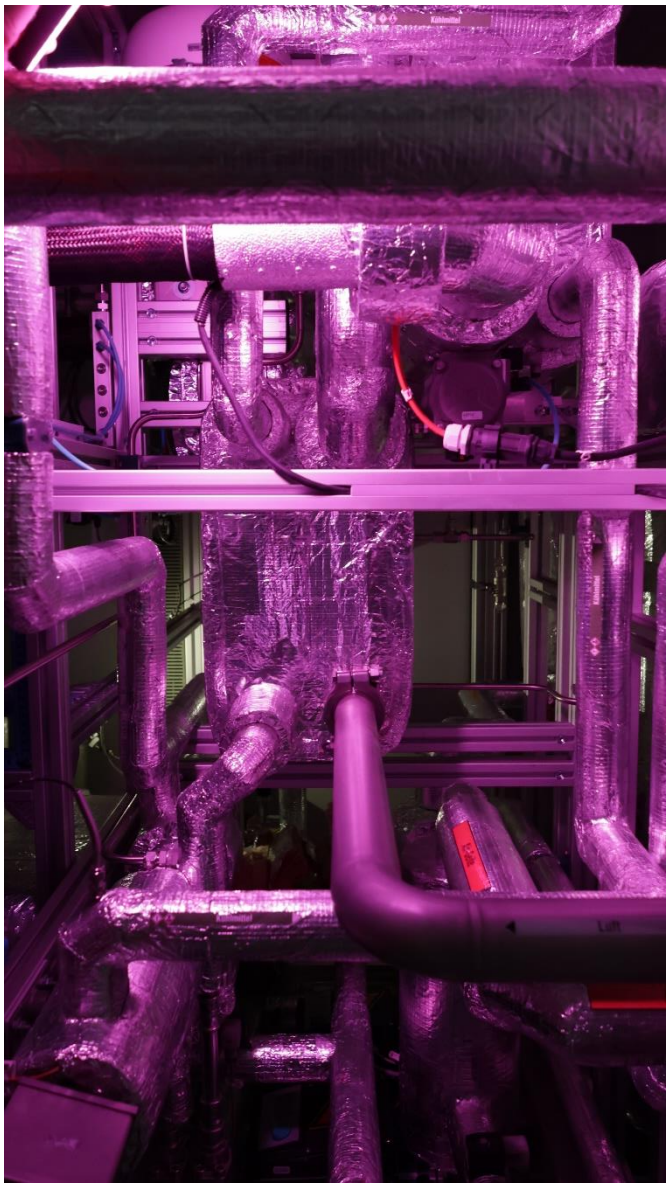

Fig. 3 Inside the test bench: Section of the air supply system and upstream heat exchanger.
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