Fraunhofer ISE

Press Release

A Sustainable Future with Hydrogen

Fraunhofer ISE demonstrates the potential of hydrogen and fuel cell technology at the Hanover Trade Fair 2012

The fraction of renewable energy in the energy mix is continually increasing. The development of storage solutions for an energy supply based on one hundred percent renewable energy is speeding ahead. Renewably generated hydrogen plays a central role in this scenario, enabling a zero-emission energy supply across all applications. The Fraunhofer Institute of Solar Energy Systems ISE in Freiburg presents a look into the future of fuel cell and hydrogen technology at the Hanover Trade Fair 2012 from the 23rd to the 27th of April, 2012 in Hall 27, Booth C60.

Sustainable Mobility

This year at the beginning of March, Fraunhofer ISE inaugurated a publically accessible, solar hydrogen filling station in Freiburg. The hydrogen is generated by electrolysis using advanced membrane technology. An on-site photovoltaic system provides the electricity on a yearly average. The filling station has the capacity to refuel passenger cars with 700 bar compressed gas storage and buses with 350 bar storage pressure. Reusable storage canisters with 200 bar or 350 bar can also be refilled. The filling station itself was promoted by the State of Baden-Württemberg, the operation by the National Organization Hydrogen and Fuel Cell Technology NOW.

Zero-emission mobility becomes possible through battery-driven electric vehicles for urban use and through fuel cell vehicles, which are especially suitable for longer distances and larger vehicles even up to buses. For several years now,

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Fraunhofer ISE has a Toyota Prius in use for research purposes. Now the institute could also take on two fuel cell vehicles of the type B-Class F-Cell from Daimler.

"We are proud to be one of the few research facilities which can test future mobility concepts in both forms, battery-driven electric and hydrogen fuel cell, and compare their performance," says Dr. Christopher Hebling, Division Director of Energy Technology at Fraunhofer ISE.

Storage for Renewable Energy Supply

With the planned expansion of renewable energy in Germany and worldwide, the need for electric and electro-chemical storage solutions is increasing. Storage solutions are necessary to absorb the fluctuations inherent in renewable energy sources. Electrolysers, which split water into hydrogen and oxygen upon the input of electricity, open up the possibility to store the electricity from renewable energy sources on an economically viable scale. Using the electrolyser in the solar filling station, Fraunhofer ISE is working on a project to investigate the use of electrolysis in Demand Side Management, that is, as a way to control the stability in the electric grid. Besides analyzing such technical system aspects, the institute also deals with the development of membrane electrolysers, which are particularly suited for coupling with renewable energy systems. At the Hannover Messe, single cell components will be exemplarily shown at the booth. Dr. Tom Smolinka, Group Leader of Chemical Energy Storage remarks, "Characterized by high power dynamics, compact construction and high efficiency, hydrogen coupled with PEM electrolysis offers the prerequisites that we need to solve the electrical storage question in a renewable energy economy." Fraunhofer ISE also shows its developments on redox flow batteries, a technology which is also excellently suited to buffer fluctuations in the power grid.

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Fuel Cells on the Test Bench

On its own specially developed test stand, Fraunhofer ISE investigates the behavior of fuel cells in the everyday application. The test stand is autonomous and suitable for outside use. For statistical considerations, thirty test cells are operated in parallel. Thus it is possible to analyze different materials and load situations simultaneously. Four such test stands were installed at four Freiburg locations with very different air pollutant loads. At present, they have been in operation for more than 4,000 hours. In combination with the available measurement stations for air analytics at the respective site, ageing effects due to environmental pollution can be identified.

Portable Fuel Cells for Medicine

Besides for mobility, fuel cells are also required for portable applications. In Hanover, Fraunhofer ISE presents a system with a power output of 100 W. It is used for recharging batteries in the field of emergency medicine. The developers of the low temperature fuel cell system are especially proud of the cold start capability. Its everyday suitability has been proven in the institute's climate chamber for temperatures ranging between -15 °C and +50 °C. In addition, the system was developed according to the appropriate standards, enabling licensees to achieve fast certification and approval. "With our wide-ranging services from consultation and testing of a standard-based development through to the testing of fuel cell products under near reality conditions, we can now further support our customers in the successful marketing of their products," remarks a visibly pleased Ulf Groos, Department Head of Fuel Cell Systems, as he describes the services at the newly opened Test Lab Fuel Cells at Fraunhofer ISE.

Even in the smallest power range, micro fuel cells are helpful. At the Fraunhofer ISE booth in Hanover, the music at the coffee bar, an annual tradition continued this year, comes out of two wireless loudspeakers, a development of

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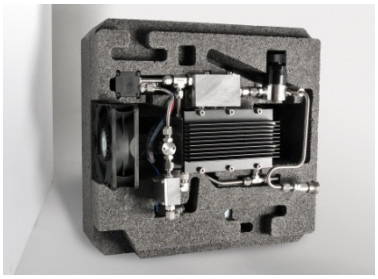
Fraunhofer IDMT in Ilmenau. The energy supply for the loud-speakers is supplied by a hydrogen-powered micro fuel cell from Fraunhofer ISE.

Left: Publically accessible, solar hydrogen filling station at Fraunhofer ISE ©Fraunhofer ISE; right: Test stand for parallel investigations on thirty test cells. The test stand is autonomous and suitable for outdoor use. ©Fraunhofer ISE



Portable fuel cell system, developed according to standards and suitable for outdoor use © Fraunhofer ISE

The text of the PR and photos can be downloaded from our web page: www.ise.fraunhofer.de

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