



Press Release

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Environmentally Friendly Power Supply with Hydrogen

Fraunhofer ISE presents developments for the market in Hanover

Fuel cells running on hydrogen provide sustainable, decentralised power both for buildings and for portable electronic appliances. The Fraunhofer Institute for Solar Energy Systems ISE will present its most recent developments for both aspects of the market at the Hanover Trade Fair in April.

In co-operation with the Masterflex company, the researchers from Fraunhofer ISE in Freiburg have developed a "Mobile Power Box" to commercial maturity. It is designed as an off-grid power supply for portable appliances with a continuous power rating of 35 W. The product will be presented in Hanover. Fraunhofer ISE will also report in Hanover on a natural-gas reformer which it has developed for fuel-cell CHP plants (combined heat and power).

The Mobile Power Box, which was displayed last year as a prototype, has now become a product. "After two years of development work, we are now pleased to present internationally leading technology with our Power Box", stated Willfried Müller, the Project Manager for Fuel Cell Technology at Masterflex. The manufacturer, Masterflex, sees its target market for the portable fuel-cell system primarily in special applications, for traffic measurement technology, traffic signals and roadworks. The Mobile Power Box is operated with hydrogen and features a high power density as well as being very reliable. It offers great flexibility in application by the option of connecting storage units of various sizes for the hydrogen supply. Both metal hydride storage units and pressurised gas cylinders can be used. The latter have the advantage that the infrastructure already

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exists. At the Hanover Trade Fair, the Power Box provides electricity for lighting the information stand: Operation for the six days of the Trade Fair is guaranteed by 160 g hydrogen from a pressurised gas cylinder.

Fuel-cell CHP plants are an important topic in the context of decentralised power supplies, e.g. for buildings. A natural-gas reformer developed at Fraunhofer ISE in Freiburg was successfully taken into operation at the Fuel Cell Testing Laboratory in Karlsruhe. This centre, which is operated jointly by the European Institute for Energy Research ElFER and the "Institut für Werkstoffe der Elektrotechnik IWE" (Institute for Electrical Engineering Materials), tests application options for fuel cells in individual buildings and in industry. Additionally a similar reformer will be delivered to the Weiterbildungszentrum Brennstoffzelle Ulm in the near future.

The natural-gas reformer for a hydrogen power of 3.5 to 6 kW was developed by the Freiburg researchers as a low-pressure reformer. In combination with a PEM (polymer electrolyte membrane) fuel cell, the complete system supplies 2 kW of electricity and around 4 kW of thermal power for space heating and domestic hot water. However, a reformer produces carbon monoxide (CO) and this is toxic for the low-temperature fuel cell catalysts. To minimise the CO content either a selective oxidation or a selective methanisation is used. "The special feature of our reformer system is that the CO concentration in the product gas is always reliably below 20 ppm", according to the project leader, Dr Thomas Aicher. "Even when the load changes, the CO concentration remains below this limit." The methane content in the reformat gas was reduced to around 1 %, resulting in a very high yield from the fuel.

The reformer system achieves an efficiency of 65 % today. Additionally, the exhaust gas from the fuel cell, which contains unreacted hydrogen, can be used thermally in the burner of the reformer, raising the total efficiency of the

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system. In the next few years, better thermal integration and further reactor optimisation will allow efficiency exceeding 80 % to be achieved for the hydrogen conversion.

At the Hanover Trade Fair from 19th-24th April 2004, Fraunhofer ISE will not only present an overview of its own developments in hydrogen technology: miniature fuel-cell development, electrolysis and reformer technology. The joint presentation with three other Fraunhofer Institutes demonstrates the cross-linking of Fraunhofer expertise on various aspects of this research topic. The Fraunhofer Institute for Chemical Technology ICT in Pfinztal near Karlsruhe works on special reforming procedures and bipolar plates for fuel cells; the Fraunhofer Institute for Physical Measurement Technology IPM in Freiburg develops sensor technology for safety monitoring, control and development; the Fraunhofer Institute for Production Technology IPT in Aachen optimises the production technology for manufacturing fuel cells.

Hannover Messe, April 19-24, 2004, Hall 13, booth F46/1

Information Material

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