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Press Release

Freiburg
March 5, 2011
No. 4/12
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Running cars on sun and water

Fraunhofer ISE inaugurates solar hydrogen filling station

On March 2, 2012, the Fraunhofer Institute for Solar Energy Systems inaugurated a solar hydrogen filling station. Sponsored by the Ministry of the Environment Baden-Wuerttemberg, the publically accessible filling station serves not only as a demonstration platform but also represents a milestone in the progressive network of hydrogen filling stations being set up in the State of Baden-Wuerttemberg. The energy transformation with the significant expansion of renewable energies needs hydrogen both as a long-term storage and as fuel for the mobility sector. Using electricity generated from solar or wind power, hydrogen is produced by means of electrolysis. Once tanked with hydrogen in a fueling time of about only 3 minutes, fuel cell cars can travel a distance of more than 400 km.

"The State of Baden-Württemberg promotes the expansion of the hydrogen infrastructure, and herewith supports the national automobile industry and its suppliers towards a sustainable, future-proof mobility. With the new solar hydrogen filling station in Freiburg, we are also pleased to have a research platform linking renewable energy and electric mobility. Because, we can only achieve our energy and climate-political aims with 'green hydrogen' – that is hydrogen generated from renewable energy sources," says Helmfried Meinel Director General, Ministry of the Environment, Climate Protection and Energy Sector for Baden-Wuerttemberg during his talk at the opening ceremony.

The hydrogen filling station in Freiburg is one of the few stations that exhibits the entire value chain – starting from electricity generated from renewable energy, through

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electrolysis and ultimately to refueling the vehicle with hydrogen. Since its founding, Fraunhofer ISE has been working on electrolysis technology, hydrogen for use in fuel cells and on hydrogen as electrical energy storage for renewably generated power. The hydrogen filling station serves as a reference project for the researchers in their quest to develop emission-free mobility for the future. Equally interesting are electrolysers which operate as flexible loads. They serve to stabilize intermittencies in the grid due to the fluctuating feed-in from renewable energy systems.

"The consequent transformation of our energy supply system to one hundred percent renewable energy is one of the essential challenges for our society in the coming years," states Prof. Eicke R. Weber, director of Fraunhofer ISE. He adds: "On the question of storage, hydrogen plays a prominent role. With hydrogen, surplus electricity can be stored in any given amount and be delivered upon demand to, for example, the mobility sector."

"The electrification of the motorized private transport (MPT) is an essential requirement for the development of an emission-free and sustainable mobility," says Dr. Christopher Hebling, Director Energy Technology Division at Fraunhofer ISE. "Especially in the mobility sector, hydrogen displays its strengths: in particular, the short fueling time required of 3 minutes and the distance range per tank which lies already over 400 km at present."

Renowned automobile manufactures have affirmed their plans to manufacture fuel cell vehicles beyond low volume production as of 2015. Leading companies from the oil industry and major electric utilities have formed the joint initiative H2 Mobility. Their goal is to build up a hydrogen infrastructure nationwide in Germany by 2017. With the new filling station at Fraunhofer ISE, the State of Baden-Wuerttemberg has achieved a milestone in its infrastructure program. The City of Freiburg is greatly pleased about its new flagship project. First Mayor of Freiburg, Otto Neideck

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says, "The City of Freiburg and the surrounding region, which shows strong involvement in innovative energy and environmental technology, are excellently suited as a model region for testing new concepts for electric vehicles under daily operating conditions."

The main components of the filling station are a 30 bar pressure electrolyser, a mechanical compressor for hydrogen compression to 700 bar, puffer storage at two different pressure levels and pumps for dispensing the hydrogen. Automobiles, busses and bikes powered by fuel cells can be tanked at the filling station. At Fraunhofer ISE, fuel cells customized for the integration in bikes were developed.

The energy needed to generate and store the hydrogen is supplied, in part, by the photovoltaic arrays mounted on the filling station roof and on the neighbouring building. The electricity from the PV system, which is recorded for the energy balance, is fed into the electricity grid through an inverter.

At the opening ceremony, over one hundred invited guests visited the new filling station. They could try their hand at the pumps and have a test drive in the fuel cell operated automobiles. Among the cars at the opening was a Mercedes Benz F-CELL World Drive that has already been driven once around the world. A further highlight at the opening ceremony was the guided tour of the newly constructed Test Lab Fuel Cell located at Fraunhofer ISE.

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Solar Hydrogen Filling Station at Fraunhofer ISE ©Fraunhofer ISE

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