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PRESS RELEASE

Diesel-powered fuel cell generates green electricity

The research partners Volvo Technology (Sweden), Johnson-Matthey (United Kingdom), Modelon AB (Sweden), PowerCell AB (Sweden), Jožef Stefan Institute (Slovenia), Forschungszentrum Jülich (Germany) and Fraunhofer ICT-IMM (Germany) have reached their final goal by the end of the FCGEN project: they have developed a diesel-powered fuel cell system and successfully demonstrated its functionality in autonomous operation mode.

The system consists of a diesel and a water tank, a hydrogen generating module (reformer) and a fuel cell module including a low-temperature-PEM-fuel-cell (LT-PEM) with 55 cells as well as a battery and power electronics.
The system is designed for the use in truck, recreational vehicle and yacht applications. It generates up to three kilowatts electrical power but can easily be modified for larger power ranges. Therewith enough output is available to run electric and electronic small consumers as well as „power guzzlers" like for instance air conditioning or refrigerators.

Hydrogen generation from diesel

To extract the hydrogen, which is needed for the fuel cell, out of the Diesel, the Diesel fuel in the tank is converted into a hydrogen-rich gas by autothermal reforming. This process was developed at Forschungszentrum Jülich and has already proven its high stability for a duration in the range of 10,000 hours. Carbon monoxide which is also generated by the reforming process is initially converted to a remaining low concentration (< 10 ppm) by means of further reactors (plate heat exchangers by Fraunhofer ICT-IMM) being part of the fuel processor. This is also valid for the sulfur which is contained in the fuel in minor amounts. The resulting gas is primarily composed of hydrogen, carbon dioxide and steam of which the hydrogen is processed in the fuel cell to generate electricity.

Fuel cell system as environmentally friendly option

The catalytic processes needed to convert diesel fuel were realized by using catalysts made by the catalyst producer Johnson-Matthey. The fuel cell developed by PowerCell is characterized by a high long-term stability. The whole system is started up by the combustion of diesel fuel and is running fully automated thanks to the control system developed at the Jožef Stefan Institute. The battery of the system is recharged automatically by the fuel cell.

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In the power range from three to ten kilowatt so far only gasoline or diesel fueled electricity generators based on combustion engines (APU) are available at the market. The FCGEN fuel cell system is working with a low noise emission and is virtually environmentally compatible. A further development of the system is planned.

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