

PRESSEINFORMATION

PRESS RELEASEApril 8, 2022 || Page 1 | 3

Power supply

Fuel cells set to substitute diesel generators

Diesel generators often provide the local power supply in developing and emerging economies – emitting millions of tons of greenhouse gases into the atmosphere. To minimize these emissions in the future, a research team from Fraunhofer IPA, together with CBC GmbH & Co. KG and the University of Bayreuth, is currently developing an electricity generator that runs on hydrogen.

In Germany, it is taken for granted that every household is connected to the power grid and power outages are a rare occurrence. In many parts of the world, however, the situation is quite different. There is often no nationwide power supply and at best unstable regional grids. In India alone, 100 million people are still not connected to the power grid. Many companies there are not supplied with electricity by power plants, but by diesel generators. In total, these produce around 940 million tons of CO₂ and although they generate an output of 140 gigawatts, they still only account for 30 % of total electric power. Because fuel is in short supply in some areas of India and is frequently stolen, there are daily power outages that can last up to eight hours, or even longer in some cases.

In the longer term, diesel generators must be replaced by emission-free alternatives. Fuel cells, in particular, are a promising option here. Technically and economically, fuel cells offer a viable alternative to battery systems due to their system properties, especially in emergency and backup power supply. Over the next three years, a research team made up of members of the Fraunhofer Institute for Manufacturing Engineering and Automation IPA, the Chair Manufacturing and Remanufacturing Technology at the University of Bayreuth and CBC GmbH & Co. KG from Ibbenbüren in North Rhine-Westphalia will be developing a fuel cell-based decentralized power generator and running practical trials.



Press communication**Jörg-Dieter Walz** | Phone +49 711 970-1667 | presse@ipa.fraunhofer.deFraunhofer Institute for Manufacturing Engineering and Automation IPA | Nobelstraße 12 | 70569 Stuttgart | www.ipa.fraunhofer.de

Closed-loop recycling concept to extend service life

PRESS RELEASE

April 8, 2022 || Page 2 | 3

Of course, the researchers do not have to develop the fuel cell from scratch, but they do have to develop the entire periphery, such as the heat exchanger, air filter and buffer cell. They will need to match the size and capacity of the individual components in order to design a generator with the capacity for reliable electric power production. This also requires a battery. "It has to step in whenever there is a demand for more electricity than the fuel cell can supply," explains Friedrich-Wilhelm Speckmann from the Center for Battery Cell Manufacturing (ZDB) at Fraunhofer IPA. "In quieter phases, the battery storage system is recharged with surplus electricity."

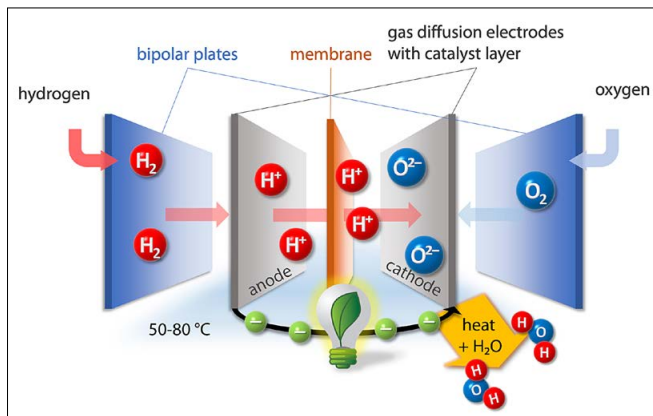
In general, the entire system must be adapted to the conditions in India. In addition to extreme environmental conditions with temperatures of up to 50°C, this also includes a service life that is as long and cost-effective as possible. To this end, the research team will also be developing a closed-loop recycling concept tailored to the decentralized power supply. "Initially, this will include predictive service and maintenance measures," says Jan Koller from the Project Group Process Innovation in Bayreuth, which is part of Fraunhofer IPA. "In the long term, however, the reuse and remanufacturing of individual components is also important," he adds.

The research team is currently still looking for a suitable partner and location in India for the trial phase and is being supported by the Indo-German Chamber of Commerce (AHK India). For comparative purposes, a second prototype is being put into operation at CBC in Ibbenbüren.

Modular principle enabling a wide range of applications

The demo plant will be based on the modular principle. This will simplify production of scalable and versatile decentralized power generators at a later stage. Ultimately, this will also reduce production costs and increase competitiveness by comparison with diesel generators. This is because the prototype will later be used as the basis for developing emergency power generators or mobile generators for humanitarian aid operations. At the same time, the prototype will also serve as a basis for the development of fast-charging stations at which battery-powered devices can be recharged. This will ensure the widespread use of fuel cell technology in areas not connected to a power supply or where the power supply is unstable.

The German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) is funding the research project to the tune of around € 1.62 million over the next three years as part of the Environmental Technologies Export Initiative program. Of this, around € 686,000 will go to Fraunhofer IPA. The project is supported by the National Organization of Hydrogen and Fuel Cell Technology (NOW GmbH), which, as a project company on behalf of the BMUV, is responsible for the thematic focus of hydrogen and fuel cell technologies for decentralized and grid-based power generation in the context of the export initiative.


PRESS RELEASE

April 8, 2022 || Page 3 | 3

Construction of a fuel cell: Hydrogen and oxygen are introduced via the two bipolar plates and the two gases react with each other in the membrane electrode unit to form water. This chemical reaction releases energy in the form of electric current and heat.

Source: University of Bayreuth/image credit: Andreas Rosin

Project profile

Title	Decentralized power generator using fuel cell technology (ECO-FCGen)
Partners	Fraunhofer IPA, Chair Manufacturing and Remanufacturing Technology (LUP) at the University of Bayreuth, CBC GmbH & Co. KG
Duration	January 1, 2022 to December 31, 2024
Funding	€ 1.62 million
Funding source	German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection

Expert contact

Dr.-Ing. Friedrich-Wilhelm Speckmann | Phone +49 711 970-3690 | friedrich-wilhelm.speckmann@ipa.fraunhofer.de | Fraunhofer Institute for Manufacturing Engineering and Automation IPA | www.ipa.fraunhofer.de

Jan Koller | Phone +49 921 78516-434 | jan.koller@ipa.fraunhofer.de | Fraunhofer Institute for Manufacturing Engineering and Automation IPA | www.ipa.fraunhofer.de

Press officer

Hannes Weik | Phone +49 711 970-1664 | hannes.weik@ipa.fraunhofer.de

With nearly 1000 employees, the **Fraunhofer Institute for Manufacturing Engineering and Automation**, Fraunhofer IPA, is one of the largest institutes in the Fraunhofer-Gesellschaft. The total budget amounts to more than € 74 million. The institute's research focus is on organizational and technological aspects of production. We develop, test and implement not only components, devices and methods, but also entire machines and manufacturing plants. Our 19 departments are coordinated via six business units, which together conduct interdisciplinary work with the following industries: automotive, machinery and equipment industry, electronics and microsystems, energy, medical engineering and biotechnology as well as process industry. The research activities of Fraunhofer IPA aim at the economic production of sustainable and personalized products.