Leistungszentrum Elektroniksysteme

A JOINT INITIATIVE OF FRAUNHOFER IIS, FRAUNHOFER IISB, AND FRIEDRICH-ALEXANDER UNIVERSITY ERLANGEN-NÜRNBERG (FAU)

DC backbone with power-to-gas coupling

Compact demonstrator setup for the dehydrogenation of liquid organic hydrogen carriers

DESCRIPTION

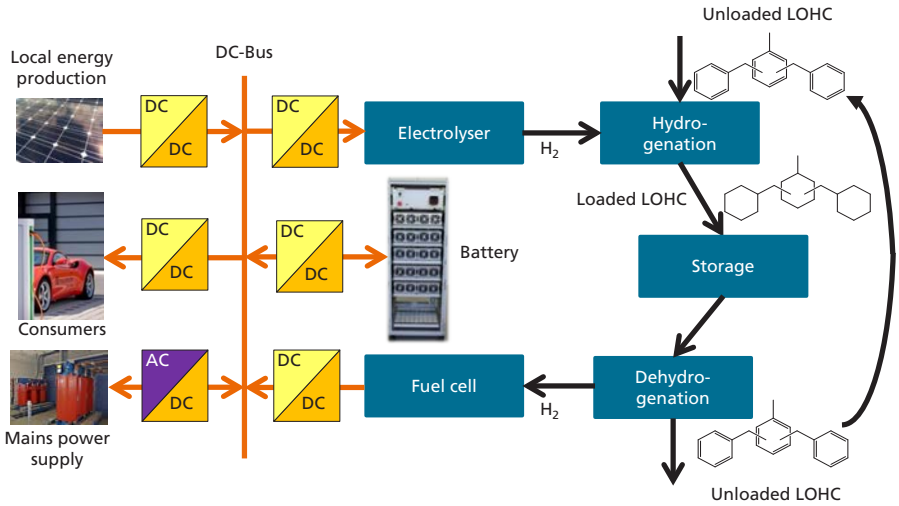
The **DC backbone with power-to-gas coupling** offers a complete solution for the efficient integration of short-term and long-term energy storages within local microgrids. This comprises the optimized combination of **highly efficient lithium-ion batteries** for compensation of short-term fluctuations and a **hydrogen storage system** for the long-term storage of energy. The generated hydrogen is stored under ambient conditions by loading a **liquid organic hydrogen carrier (LOHC)** within a chemical reactor. One main advantage of that storage technology is the **very high energy density**, which allows the **compact prototype setup** of the chemical energy storage system within a 20 ft-Container.

To couple the storage systems and PV-arrays with the DC micro grid, **intelligent control systems** and **highly efficient DC/DC-converters** as well as a **reliable communication network** are needed.

FEATURES

- High energy and power density due to coupling of batteries and hydrogen storage
- Efficient DC-coupling through newly developed DC/DC-converters
- Safe storage of hydrogen within a liquid under ambient conditions
- Fast reactor behavior and compact system setup through innovative one-reactor concept
- Low communication effort for voltage regulation through implemented Droop Control
- Reliable and secure communication network
- Intelligent energy management systems

SYSTEM SETUP



TECHNICAL DATA

DC backbone	
DC-Bus voltage	+/- 380 V
Efficiency of DC/DC-converters	>96%
Hydrogen storage system	
Electrical Storage capacity*	1 MWh
Self-discharge (per month)	<1%
Maximum Charging and Discharging Power	30 kW
Battery storage	
Maximum Charging and Discharging Power	100 kW
Electrical storage capacity	20 kWh

** expandable by 15 MWh per additional container*

PROJECT PARTNERS

- Fraunhofer Institute for Integrated Systems and Device Technology IISB
- Fraunhofer Institute for Integrated Circuits IIS
- Chair of Electron Devices (LEB), FAU
- Institute of Chemical Reaction Engineering (CRT), FAU

CONTACT US

We develop and realise new approaches for the storage of electrical energy, featuring innovative power electronics within intelligent DC microgrids and advanced hydrogen technologies. This also covers the development of specific simulation models and control strategies for grid stability and energy flows.

Fraunhofer Institute for Integrated Systems and Device Technology IISB
Schottkystrasse 10
91058 Erlangen, Germany

Contact
Bernd Wunder
Tel. +49 (0)9131 761-597
bernd.wunder@iisb.fraunhofer.de

www.iisb.fraunhofer.de
www.lze.bayern