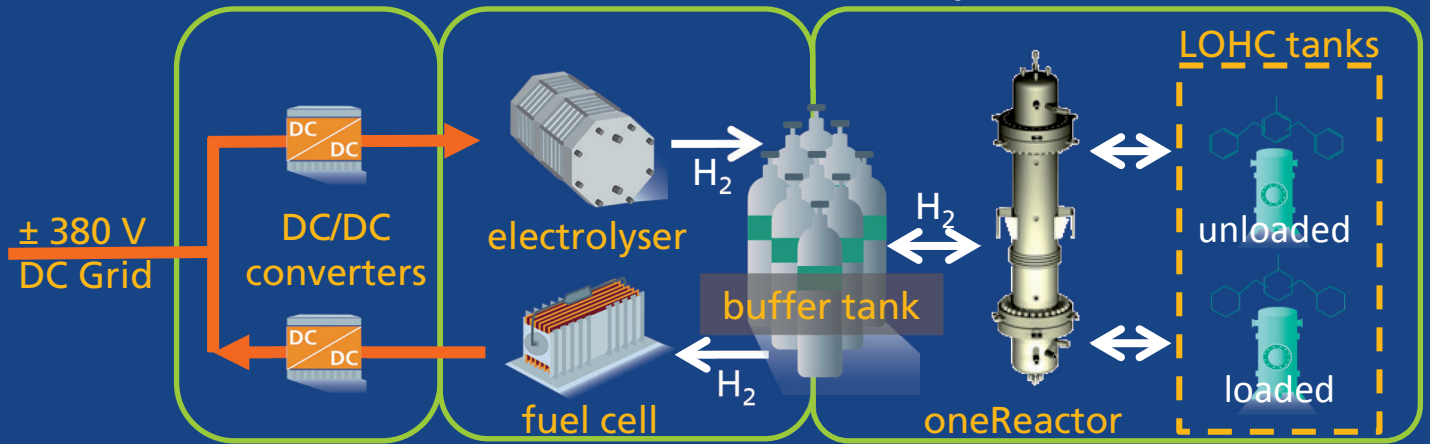


LOHC systems

Demonstration and Modelling of Advanced Hydrogen Storage Systems Based on Liquid Organic Hydrogen Carriers (LOHC)



Demonstration Setup



Description

Advanced hydrogen storage systems based on liquid organic hydrogen carriers (LOHC) are a promising solution for applications with high amounts of energy to be stored. LOHC enables the storage of hydrogen under ambient conditions within a liquid so neither compression nor cooling is needed for the storage of hydrogen itself. Therefore, LOHC is an appropriate technology to realise long-term storage systems up to seasonal storage of energy. Fully loaded, 1.9 MWh based on the lower heating value of hydrogen can be stored within 1 m^3 of LOHC which means an energy density close to cryogenic liquid hydrogen. By combining the LOHC system with an electrical storage, the whole system can act as a flexible storage solution performing short-term and long-term storage processes.

At Fraunhofer IISB in Erlangen, a 20 ft container including electrolyser, fuel cell, a novel reactor for the hydrogenation and dehydrogenation of LOHC and the LOHC tanks is build up.

Applications

- Realizing grid services (load shifting, peak reduction, uninterruptible power supply) and power-to-x facilities within industrial plants
- Autonomous power supply for off-grid applications
- Seasonal storage of excess energy from renewable energy generation, e. g. wind turbines
- Mobiles (e. g. ships, trains) using LOHC as a rechargeable fuel
- Hydrogen logistics infrastructure

Services and solutions

- Research and demonstration platform for LOHC systems
- Concept development for LOHC systems
- Development and setup of smart control algorithms for LOHC and hydrogen systems
- Customized dynamic models for advanced hydrogen storage systems
- Data acquisition and evaluation of LOHC and hydrogen storage facilities

Research and demonstration platform



20 ft container at Fraunhofer IISB in Erlangen

(Picture: Kurt Fuchs / Fraunhofer IISB)

Technical data

electrolyser	25 kW _{el}
fuel cell	25 kW _{el}
LOHC tanks	300 liters (approximately 600 kWh H ₂ *)

*expandable by 20 MWh H₂ per additional tank container



View inside the 20 ft container with electrolyser (left), fuel cell (center) and oneReactor (right)

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