

Electrical Energy Storage (EES)

Head: Prof. Dr. Wolfgang Bessler

The storage of electrical energy plays a key role in an energy economy with large amounts of solar and wind power, as well as it is the key component of electromobility. Electrochemical energy conversion and storage consists of batteries, fuel cells, and electrolyzers. These devices allow the interconversion of chemical and electrical energy with high efficiency and large storage capacity. Therefore, they have become an integral part of our everyday lives.

The research group Electrical Energy Storage (EES) is headed by Prof. Dr. Wolfgang Bessler and is located at the **Institute of Energy System Technology (INES)**. Our central research theme is computational battery and fuel cell technology. We develop and apply multi-scale and multi-physics mathematical models in order to understand and improve batteries and fuel cells. We also study their integration into energy systems. In addition, experimental cell characterization is carried out. Goal is the knowledge-based development of electrical energy storage with improved performance, durability, energy density, and safety.

We work on the following development topics:

- Batteries: Lithium-ion battery, lithium-air battery, sodium-air battery
- Fuel cells: Polymer electrolyte membrane fuel cell (PEMFC), solid oxide fuel cell (SOFC)
- System technology: Energy system simulation, smart microgrids with power-to-gas and power-to-heat

The activities are being carried out within publicly-funded projects, industry cooperations, as well as running PhD and undergraduate theses.

A summary of the activities can be downloaded here (in German): [Wolfgang G. Bessler, „Elektrische Energiespeicherung mit Batterien und Brennstoffzellen“](#), Forschung im Fokus, Hochschule Offenburg (2018).