

System Technology

The integration of electrochemical cells (batteries, fuel cells, electrolyzers) in renewable energy systems requires a detailed understand of both, the cell behavior and the system boundary conditions. Computer simulations are a viable tool for developing system design and operation strategies.

Energy management in stationary PV/battery systems

The local storage of photovoltaic electrical energy in batteries plays a key role for the residential and small-scale industrial *Energiewende* (energy revolution). Using computational models, we develop energy management strategies that consider not only the energy availability and demand, but also ageing mechanisms in the battery as well as the state of health of the electricity grid.

Fuel cells and batteries for electro-mobility

Electric cars have a highly dynamic power demand, which poses specific challenges towards cycleability and lifetime of fuel cells and batteries. We use virtual driving cycles (e.g., new european driving cycle) to calculate realistic boundary conditions for the fuel cell, allowing to predict their long-term performance behavior. We also assess the potential of next-generation cells, such as the lithium-air battery, for use in electric vehicles.