




ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

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## ENERGY STORAGE

*A strategic technology asset for energy systems (e.g. smart grids) with widespread deployment of renewable energy sources and the driver of zero emission E-mobility. Hybrid systems, combining different storage technologies, represent a promising solution in several application fields.*



Progress in energy storage requires the exploitation of skills at all levels of the value chain. Different aspects of science, including fundamental chemistry and physics, materials science, engineering and economics are involved. Due to its multidisciplinary nature, the University of Bologna is the ideal research partner in the field of energy storage.

- Electrochemical characterization of electrochemical energy storage devices
- High-voltage supercapacitors
- Hydrogen based storage systems
- Lab-scale next-generation lithium metal and lithium-ion batteries
- Life Cycle Assessment of storage devices
- Modeling and characterization of electrical energy storage devices
- Optimal management of storage units in smart grids
- Power to Gas and Power to Liquid
- Pumped-hydro Storage
- Residential (thermal) storage
- Storage for e-mobility
- Storage and converters for fast charging station
- Storage and converters for photovoltaic generation
- Superconducting Technologies for Energy Storage (SMES and flywheels)
- Thermal Smart Grids

### HIGHLIGHTS

The **Laboratory of Electrochemistry of Materials for Energetics (LEME-CHIM)** develops activities concerning: characterization of lab-scale lithium batteries, supercapacitors, fuel cells, synthesis of electrode and electrolyte materials and separators, electrode processing, integration of electrochemical energy storage devices with solar cells and fuel cells.

The **Laboratory of Magnet Engineering and Applied Superconductivity (LIMSA - DEI)** develops power superconducting devices and high field magnets, also in collaboration with CERN and ITER. Prototypization and modelling activities are carried out.

### European Projects

**CONDOR** - *C*OMBINED *su*N-Driven Oxidation and CO<sub>2</sub> Reduction for renewable energy storage H2020

**HyFlow** - *D*evelopment of a sustainable hybrid storage system based on high power vanadium redox flow battery and supercapacitor - technology H2020

**CuBER** - *C*opper-Based Flow Batteries for energy storage renewables integration H2020

**OSMOSE** - *O*ptimal System-Mix Of flexibility Solutions for European electricity H2020

**LABOHR** - *L*ithium-Air Batteries with split Oxygen Harvesting and Redox processes H2020.