ABOUT THE SMHYLES PROJECT

The EU project SMHYLES is developing novel salt- and water-based hybrid energy storage systems on an industrial scale.

SMHYLES started in January 2024 and will run until December 2027. The project is being carried out in cooperation with 15 other partners from Germany, Italy, Portugal, Switzerland, Spain, the Czech Republic, and Tunisia. The EU is funding the project under the European Framework Programme for Research and Innovation „Horizon Europe“ with around €6 million.

PROJECT PARTNERS

- Fondazione Bruno Kessler
- Technology Centre for Energy (TZE) University of Landshut
- Fraunhofer Gesellschaft zur Foerderung der angewandten Forschung eV
- Bavarian Research Alliance (BayFOR)
- Fundacion CIRCE Centro de Investigacion de Recursos y Consumos Energeticos
- Schmid Energy Systems GmbH
- Charge2C-NewCap Lda
- FZSONICK Spa
- Capwatt SA
- Capwatt Services Sa
- Graciólica Unipessoal Lda
- Inesc Tec - Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciencia
- Univerzita Tomase Bati ve Zline
- RINA Consulting Spa
- COMETE International
- Indrivetec AG
- EDA - Electricidade Dos Acores SA

PROJECT PROFILE

PROJECT

SMHYLES – Safe, Sustainable and Modular Hybrid Systems for Long-Duration Energy Storage and Grid Services

PROGRAMME

Horizon Europe Funding:
HORIZON-CL5-2023-D2-01-05 (Batt4EU)

EU CONTRIBUTION

approx. EUR 6 million

PROJECT COORDINATION

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Co-funded by the European Union

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SMHYLES

SAFE, SUSTAINABLE AND MODULAR HYBRID SYSTEMS FOR LONG-DURATION ENERGY STORAGE AND GRID SERVICES

NOVEL SALT- AND WATER-BASED HYBRID ENERGY STORAGE SYSTEMS

Each storage technology has technical and economic characteristics that are ideally suited for a specific application. These characteristics include, for example, energy and power density, reaction time, environmental sustainability, and safety. Redox flow and salt batteries have a large storage capacity but can only be charged and discharged slowly.

A supercapacitor, on the other hand, has fast charging times but cannot store large energy quantities over a long period of time. Only the efficient combination of both functionalities provides the necessary performance and flexibility in use.

„Modern energy storage systems need to guarantee security of supply, performance and safety, have flexible management software and be manufactured and operated in the most sustainable and environmentally friendly way possible"

SMHYLES coordinator Edoardo G. Macchi

DEMONSTRATORS IN PORTUGAL AND GERMANY

The SMHYLES activities include the development, construction, deployment and demonstration of an aqueous hybrid energy storage system and a salt-based hybrid energy storage system, as well as an extension of the storage duration of an existing hybrid system.

During the second half of the project, various use cases will be trialled for 12 months in the three pilot plants in Portugal and Germany:

1. **Industrial microgrid (Portugal, Maia)**: Further development of a vanadium redox flow battery and combination with a water-based supercapacitor, with the aim to increase the level of renewable energy source penetration in the energy mix, as well as the electric vehicle charging support.

2. **Island grid (Portugal, Graciosa)**: Off-grid energy system with the installation of a nickel-carbon water-based supercapacitor and a salt battery supporting the island electric grid.

3. **Pilot plant expansion (Pfinztal, Baden-Württemberg, Germany)**: Capacity expansion of a redox flow battery and combination with a supercapacitor (from the EU project HyFlow) and a wind turbine; this should enable multi-day energy storage and increase grid reliability.

COMBINING SUSTAINABLE BATTERIES WITH OTHER STORAGE SYSTEMS

The central goal of the SMHYLES project is to develop and demonstrate such innovative, safe, and sustainable hybrid energy storage systems on an industrial scale. In SMHYLES, a water-based supercapacitor and either a redox flow battery or a salt battery are to be combined to create innovative hybrid energy storage systems.

The novel hybrid storage systems developed in SMHYLES should be able to store energy over a medium to long period of time and release it very quickly. At the same time, they will reduce the use of critical raw materials, be safe to use (as they are not easily flammable), cost-effective and recyclable.

Compared to conventional solutions, these new storage systems are expected to have a 40 per cent lower carbon footprint, also thanks to novel recycling solutions, and a 20 per cent higher reliability and availability, which should make our renewables-based power grids more resilient.

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