

Energy Storage Research in Switzerland – The SCCER Heat & Electricity Storage

The declared aim of the Swiss Energy Strategy 2050 is the transition from nuclear power to a highly efficient energy system with power supply based on renewable sources, to meet the CO₂ emission targets. For a smooth transition, an important factor is to expand and strengthen the knowledge in the energy field through the increase of personnel resources, e.g. scientists, engineers, technicians alongside with the development of new technologies. Besides other actions taken by the Swiss Government, in 2014 eight *Swiss Competence Centers for Energy Research (SCCER)* have been established, receiving their funding through the Commission for Technology and Innovation Switzerland (CTI). The Centers cover different action fields in energy research, viz. Mobility,^[1] Efficiency,^[2] Supply of Electricity,^[3] Grids,^[4] Biomass,^[5] Economy & Environment,^[6] as well as Heat and Electricity Storage.^[7]

The Centers are organized as virtual consortia of industrial and academic institutions (Cantonal Universities, Universities of Applied Sciences, Federal Institutes of Technology and Research Institutions, respectively) with the intention to maximize the technological outcome by combining the strongest competencies in each area of expertise.

Energy Storage is a key element within the Federal Energy Strategy since energy, sourced from renewables like wind and solar energy, is only available on an intermittent, stochastic basis. Storing excess energy during times of low energy demand and releasing it in times of high energy demand is not only useful from an energetic perspective, it also may create an economic value within the energy market. With an increasing contribution of the aforementioned renewable energy sources to the electricity mix, the significance of energy storage increases. This is clearly demonstrated by countries having installed large capacities of wind and photovoltaic power, e.g. Germany and Denmark. Large intermittent discrepancies between electricity production and demand are being observed with the consequence of a strongly fluctuating electricity price causing also challenges to the stability of the power supply system. In order to stabilize the grid, an increase in short-term electricity storage capacity (hrs) with high response time is needed within the next years. In the long run, seasonal storage becomes important to ensure constant electricity supply without conventional fossil based power generation.

Heat, aside from electricity, is one of the most required types of energy today. About 50% of the primary energy carriers are transformed to heat by modern industrialized societies required for space heating, hot water and process heat. Thus, it becomes obvious that a sensible use of energy must not neglect the questions related to heat storage.

The research and development within the *SCCER Heat and Electricity Storage* concentrates on five different topics with the involvement of more than 20 research groups from eleven public institutions as well as from the private sector. In detail, R&D is performed on direct electricity storage in batteries, electricity storage in hydrogen and synthetic fuels, short-term and seasonal heat storage as well as the interaction and integration of different storage technologies.

Within this special issue of CHIMIA entitled *Energy Storage Research in Switzerland* we have the opportunity to present 15 papers from the participating groups of the *SCCER Heat & Electricity Storage* highlighting their research in this exciting, interdisciplinary field of Energy Storage forming a perfect place to find an overview of the Swiss activities.

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[1] SCCER Mobility, www.sccer-mobility.ch, accessed Sept. 09, 2015.

[2] SCCER FEEB&D, www.sccer-feebd.ch; SCCER EiP, www.sccer-eip.ch, both accessed Sept. 09, 2015.

[3] SCCER SoE, www.sccer-soe.ch, accessed Sept. 09, 2015.

[4] SCCER Furies, www.sccer-furies.epfl.ch, accessed Sept. 09, 2015.

[5] SCCER Crest, www.sccer-crest.ch, accessed Sept. 09, 2015.

[6] SCCER Biosweet, www.sccer-biosweet.ch, accessed Sept. 09, 2015.

[7] SCCER Heat & Electricity Storage, www.sccer-hae.ch, accessed Sept. 09, 2015.

The Editorial Board of CHIMIA is very grateful to the guest editors Prof. Dr. Thomas J. Schmidt and Dr. Jörg Roth for the successful realization of this special issue on Energy Storage Research in Switzerland - The SCCER Heat & Electricity Storage; providing readers with an excellent overview of an interdisciplinary project with great significance for the future.