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The Swiss Competence Center for Energy Research (SCCER) "Heat and Electricity Storage" (HaE) is one of eight centers, which have been established 2014 in the research fields of mobility (SCCER Mobility), efficiency (SCCER FEEB+D, SCCER EIP), power supply (SCCER SoE), grids (SCCER FURIES), biomass (SCCER Biosweet), energy storage (SCCER HaE), as well as economy and environment (SCCER CREST) , all aiming to enable the transition to a future sustainable energy system based on 100% renewables.

The project has 24 academic collaborators based on national and cantonal universities and universities of applied science accompanied by numerous Industrial implementation partners.

Now we are in the middle of the second and last funding phase and promising results can be reported in the 5 areas of our project:

Heat Storage:

- High temperature Heat Storage for industrial application.[1,2]
- The first adiabatic compressed air storage demonstration unit.[3]

Battery Research:

- Na-ion battery materials.[4]

Hydrogen Technologies:

- Dual circuit redox flow battery producing hydrogen.[5]
- Formic acid based Fuel Cell-APU.[6]

Synthetic Fuels:

- Electrochemical CO₂ reduction.[7]
- Power to Gas demonstration unit.[8]

System Assessment:

- Advanced scenario modeling to assess economic and environmental impact of storage technology.[9]
- Of course, this is only a selection...

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[2] PERRAUDIN, David, et al. Phase change material systems for high temperature heat storage. *CHIMIA International Journal for Chemistry*, 2015, 69. Jg., Nr. 12, S. 780-783.

[3] BECATTINI, V., et al. Pilot-scale demonstration of advanced adiabatic compressed air energy storage, Part 2: Tests with combined sensible/latent thermal-energy storage. *Journal of Energy Storage*, 2018, 17. Jg., S. 140-152.

[4] MARINO, Cyril, et al. Biowaste Lignin-Based Carbonaceous Materials as Anodes for Na-Ion Batteries. *Journal of The Electrochemical Society*, 2018, 165. Jg., Nr. 7, S. A1400-A1408.

[5] PELJO, Pekka, et al. All-vanadium dual circuit redox flow battery for renewable hydrogen generation and desulfurisation. *Green Chemistry*, 2016, 18. Jg., Nr. 6, S. 1785-1797.

[6] YURANOV, Igor, et al. Heterogeneous catalytic reactor for hydrogen production from formic acid and its use in polymer electrolyte fuel cells. *ACS Sustainable Chemistry & Engineering*, 2018, 6. Jg., Nr. 5, S. 6635-6643.

[7] DUTTA, Abhijit, et al. Electrochemical CO₂ conversion using skeleton (sponge) type of Cu catalysts. *ACS Catalysis*, 2017, 7. Jg., Nr. 8, S. 5431-5437.

[8] <https://www.psi.ch/media/esi-platform>

[9] ZHANG, Xiaojin, et al. Life Cycle Assessment of Power-to-Gas: Approaches, system variations and their environmental implications. *Applied Energy*, 2017, 190. Jg., S. 326-338.