Research Project

In the frame of the demonstration project, a means of hydrogen generation directly from the redox flow battery is also being developed. This system, called “Dual-circuit redox flow battery”, consists in the use of the (partially) charged electrolytes in external circuits for their chemical discharge (Patent N° WO2013131838 A1). The discharge reaction generates hydrogen on the positive side and oxygen (or other compounds) on the negative side.

This system is multifunctional, allowing energy storage in the electrochemical form and to supply electricity or to produce hydrogen. This provides the battery with an increased storage capacity, an improved energy density, as well as a large variety of applications.

Currently, a demonstration system is being evaluated. It is composed of an all-vanadium redox flow battery of 10 kW (40 kWh) and of a catalytic reactor for the generation of hydrogen. In this system, hydrogen can currently be generated at a power of 3.2 kW (LHV).

Demonstration project EPFL-LEPA

Electricity and hydrogen storage for e-mobility

Rue des Chantons 51, 1920 Martigny, Suisse
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Spring 2016
**Service station project**

**Electrical grid**

- [Energy Gildemeister](http://energy.gildemeister.com)

**Redox Flow Battery (RFB)**

This battery has a central role in this system, as it provides storage of cheap, surplus energy while supplying continuous power to the electrolysers and to the electric charging station. With a power of 200 kW and a capacity of 400 kWh, the battery buffers the consumption peaks associated with the vehicle charging and to continuously feed the electrolysers.

**Electrolysers**

An alkaline and a PEM electrolyser will be used in parallel. Both electrolysers will be compared in terms of their use flexibility. They are fed by a DC line from the RFB. With a power of 50 kW, the alkaline electrolyser will be run continuously at partial power, while the PEM electrolyser (30 kW) will primarily be started during periods of high hydrogen demand.

**Hydrogen storage**

Hydrogen will be stored on-site in 50 L bottles at 200 bar. The total hydrogen storage capacity is sufficient to recharge 10 cars. This hydrogen storage also provides an additional energy buffer for the site.

**Electric cars charging station**

This charging station will be fed directly from the DC bus of the RFB. It will provide fast charging to the battery of the car (>50 kW) using the standard connections CHAdeMO and CCS.

**Hydrogen refilling station**

In the first phase, this service station will supply hydrogen to two fuel cell cars. It will initially provide hydrogen at 350 bars or 700 bars with a recharge capacity of 4 cars per day.