Kurzzusammenfassung in englischer Sprache

Hydrogen (H_2) as an energy carrier is economically producible regenerative in large quantities and serves among other things as fuel for fuel cell vehicles. Owing to the high energy content of H_2 and the simple refuelling process (compressed gas), Fuel Cell (FC) vehicles are characterized by high reach. Refuelling takes only a few minutes. In 2016 three BZ vehicle types were already available in Germany. The development of a H_2 filling station network is a key factor in the market introduction of FC vehicles. By 2018/19, the number of H_2 stations across Germany will be expanded to 100 filling stations. One of them went into operation in July 2016 at the ZSW in Ulm.

The Center for Solar Energy and Hydrogen Research (ZSW) was enabled by the investments in future-oriented equipment funded in project BWH15001 to sustainably support the development of hydrogen infrastructure in Baden-Württemberg and beyond. The main focus of the research was the monitoring, acceptance and optimization of the fuelling quality according to SAE J2601 from hydrogen filling stations through a Test-Device named Fueling Station Test Module – FSTM.

Hydrogen Refuelling Stations (HRS) are approved prior to initial commissioning and then regularly checked. With a device developed and procured within the scope of this project, the ZSW will be able to offer the approval of the refuelling quality according to the SAE J2601 directive, which is applied worldwide for HRS. In addition, the quantity of H_2 injected is recorded and thus a contribution to the development of a verifiable quantity measurement can be provided. Furthermore, it is possible to extract H_2 samples for laboratory analysis.

Hydrogen may contain deleterious contaminants for fuel cells in small amounts (e.g., carbon monoxide CO). Permissible limits in the parts per million (ppm) or even parts per billion (ppb) -range are defined in ISO 14687-2. Today there is no independent laboratory in Germany to verify those limits. At the ZSW, sophisticated measuring technology was obtained for this trace analysis, with which an important part of these low limit values for the hydrogen quality can be verified in the delivery state, during removal and delivery to the vehicle drive.

The review of a concept for quick and easy online evaluation of the hydrogen quality with regard to fuel cell compatibility is also project content and has already been successfully processed in the last reporting period. A, for harmful substances in the hydrogen, highly sensitive Fuel Cell – Membrane Electrode Assembly (MEA) was identified. The influence of the operating parameters on the sensitivity to the main pollutant CO was quantified and an optimum range for the sensor operation wasdefined.

In order to increase the acceptance of hydrogen technology in public perception, an information area was conceptualized and implemented at the hydrogen filling station opened in July 2016.