

iv2splus INFONET

Fahrzeugtechnologien, MdZ 5. Call (2014)

FCH REFuel

FCH REFuel - Entwicklung einer modularen Low-Cost H2-Tankstelle mit Elektrolyse für 350 und 700 bar und FC REX Fahrzeug

A modular scalable and cost effective hydrogen supply infrastructure for industrial, automotive and mobile applications will be developed. Different customer applications will be considered. Therefore standardized modules like high pressure 350 bar electrolyzer module, 700 bar single stage compressor module, a storage and dispenser modul for both pressure levels will be developed and implemented. Furthermore an existing battery-powered transport vehicle for municipal and urban applications (ELI) will be upgraded with a fuel cell range extender system (H2ELI) to enlarge range and minimize refueling time. System integration into the existing vehicle will be done after testing and optimization at an innovative existing fuel cell system integration test bed. Finally the interaction of the modular infrastructure and fuel cell vehicles will be analyzed for two different applications.

Fahrzeugtechnologien
MdZ 5. Call (2014)

Project coordination

Fronius International GmbH
Dr. Ewald Wahlmüller

Tel.: +43-7242-241-5100

E-Mail: wahlmueller.ewald@fronius.com

Problem and situation:

The availability of hydrogen fueling stations for the transport sector in Austria is highly limited. Two existing stations are currently in use (Vienna and Graz). Another station is planned in Innsbruck. Nonetheless solutions for a cost effective and flexible scalable hydrogen infrastructure technology with a broad field of application like home refueling facility or decentralized hydrogen infrastructure in large companies with large hydrogen vehicle fleets is needed. For economically operation of decentralized hydrogen infrastructure a highly degree of capacity utilization is needed. Projects in the intralogistic sector where vehicle and infrastructure solution were considered and developed as unit have proven its worth. This concept is transferable to logistic, municipal and urban vehicle applications too.

Objectives and methods:

For that reason a modular scalable low-cost H2 infrastructure solution on the basis of a high-pressure PEM electrolyzes for a broad field of applications shall be developed. During the conception phase automotive applications, home refueling, material handling and niche applications such as refueling of municipal vehicles, construction machinery and airport ground support equipment shall be considered. The modularity of the hydrogen infrastructure refers to the electrolysis performance, the number of dispensers and the pressure range. Based on a 350 bar infrastructure unit without compressor, a 700 bar unit with a single-stage compressor is developed to be able to operate vehicles with 700 bar fuelling systems too. High availability, energy efficiency and low maintenance shall be achieved by redundancies in the plant structure, a high level of pressure at the compressor inlet and waste heat recovery. The system implementation and facility integration for two different fields of application take place at SFL and DB Schenker. The H2 infrastructure at SFL will be electrically powered by an existing combined photovoltaic and wind system and will be used for refueling a municipal hydrogen fuel cell vehicle (H2ELI). Therefore the existing battery-powered transport vehicle for municipal and urban applications (ELI) will be upgraded with a fuel cell range extender system (H2ELI) and 350 bar tank system to enlarge range and minimize refueling time. The range extender system of the H2ELI will be tested and optimized on an existing innovative fuel cell system integration test bed at HyCentA before vehicle integration will be done. At DB Schenker the existing hydrogen infrastructure will be expanded for outdoor refueling of 700 bar logistic vehicles with long range applications in future planned R&D projects. Consequently an area covering hydrogen refueling infrastructure can be utilized in the Vienna - Linz -Graz region. Finally the interaction of the innovative modular infrastructure and fuel cell vehicles will be analyzed with respect to the two different fields of application.

Results and Findings:

Due to the modular and scalable design the H2 supply infrastructure can easily be fitted to meet variable field of applications. Hydrogen production rates as well as pressure levels can be adjusted at all times to growing vehicle fleet sizes with manageable investment costs. The battery driven municipal vehicle ELI is upgraded with a modular fuel cell range extender system. The functionality and interaction of the technology is validated for two different fields of applications at SFL and DB Schenker.