RESEARCH & DEVELOPMENT

Electromobility+

FCCF-APU

Fuel Cells operating on Conventional Fuels as Auxiliary Power Units for battery electric vehicles

FCCFAPU
FUEL CELL OPERATING ON CONVENTIONAL FUELS AS AUXILIARY POWER UNIT

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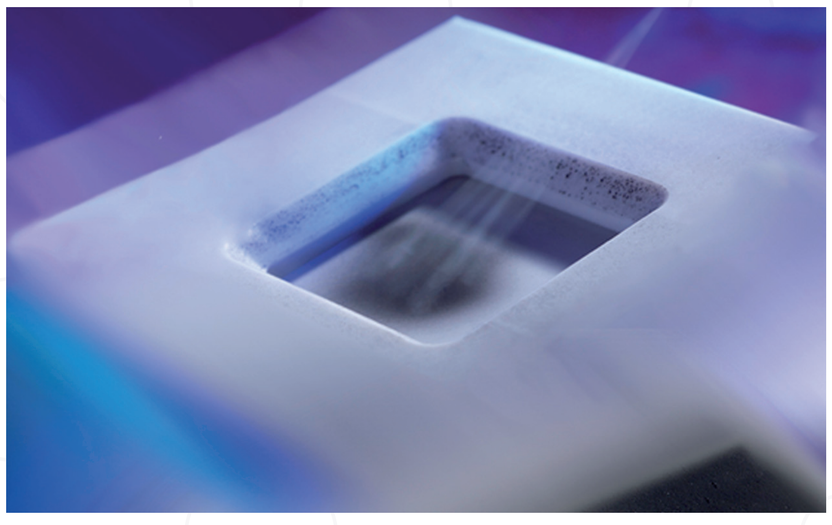
>> APU FOR CLEAN, RELIABLE AND COMFORTABLE ELECTROMOBILITY <<



Project Data

Funding/€	Total cost/€	Duration
2.219.439	3.272.558	36 months

Partners

Fraunhofer Institute for Chemical Technology, DE
Fraunhofer Institute for Solar Energy Systems ISE, DE
Serenergy A/S, DK | Danish Power Systems Ltd, DK
Chalmers University of Technology, SE | Impact Coatings AB, SE
Borit NV, BE-VLG | WS Reformer GmbH, DE

Main Results

- Highly efficient systems design using steam reforming with advanced thermal and water management.
- HT-PEMFC MEAs with improved operational stability in wet fuels and under start-stop conditions.
- Effective coating for corrosion protection of metallic bipolar plates in HT-PEMFC stacks.

Project conclusion

The project has successfully addressed some of the key challenges of using fuel cells as APU for passenger or small commercial vehicles. An important issue to address was to avoid the use of a special fuel requiring additional infrastructure. It was shown that a commercial steam reformer for natural gas can be adapted to convert petrol and even diesel fuel. The use of steam reforming will allow for high efficiencies even if daily start-stop cycling is accounted for. The issue of water supply was solved by a system design allowing for sufficient water recuperation for ambient temperatures up to 40 °C. The heat exchanger design does at the same time allow for the efficient heat up of the fuel cell system during startup. With respect to this issue and to the operation on steam reformed hydrocarbons with its high water content the anode structure of the membrane electrode assembly was optimised so that detrimental effects of these conditions were significantly reduced.

The modification also had a beneficial effect on the tolerance for typical impurities like CO and H_2S. With a new catalyst developed in the project even the use of fuels with high sulfur content would be possible. The lack of power density was addressed by investigating the adaption of metallic bipolar plates. Here a coating was found which in preliminary accelerated stress tests showed significant protection against corrosion by phosphoric acid in air at elevated temperatures.

The companies involved in this work package were able to enhance their production processes, reducing production cost as side effect.

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