Real operation pem fuel cells HEALTH-state monitoring and diagnosis based on dc-dc COnverter embedded EIs

Fact Sheet

Project information

HEALTH-CODE

Grant agreement ID: 671486

Project website

Start date 1 September 2015

End date 31 December 2018

Funded under: H2020-EU.3.3.8.1.

Overall budget: € 2 358 736,25

EU contribution € 2 358 736,25

Coordinated by: UNIVERSITA DEGLI STUDI DI SALERNO

Italy

Objective

HEALTH-CODE aims at implementing an advanced monitoring and diagnostic tool for μ-CHP and backup PEM fuel cell systems equipped with different stacks. Such a tool is able to determine the FC current status (condition monitoring) to support stack failures detection and to infer on the residual useful lifetime. Five failure modes will be detected: i) change in fuel composition; ii) air starvation; iii) fuel starvation; iv) sulphur poisoning; v) flooding and de-hydration.

The main project objectives are: i) the enhancement of electrochemical impedance spectroscopy (EIS) based diagnosis; ii) the development of a monitoring and diagnostic tool for state-of-health assessment, fault detection and isolation as well as degradation level analysis for lifetime extrapolation; iii) the reduction of experimental campaign time and costs. Moreover, the improvement of power electronics for FC is also considered. These targets will be achieved through the implementation of several methodologies and techniques, well suited for industrial application.

Several algorithms will be developed relying on on-board EIS measurements of the fuel cell system impedance. Moreover, low-cost diagnostic concepts are also proposed for a straightforward implementation on FCS controllers.

The project exploits the outcomes of the previous FCH 1 JU funded project D-CODE, during which a proof
of-concept validated in laboratory (TRL3-4) was developed. HEALTH-CODE will increase the TRL up to level 5.

The exploitation of the project outcomes will lead to low-cost and reliable monitoring and diagnostic approaches and related applications (e.g. power electronics). These results will have an impact on stationary FCS with a direct increase in electrical efficiency, availability and durability, leading to a reduction in maintenance and warranty costs, thus increasing the customers’ satisfaction. Therefore, HEALTH-CODE contributes to the enhancement of FC competitiveness towards a wider market deployment.

Field of Science

/natural sciences/chemical sciences/analytical chemistry/spectroscopy
/engineering and technology/environmental engineering/energy and fuels/fuel cell
/social sciences/economics and business/business and management/commerce

Programme(s)

H2020-EU.3.3.8.1. - Increase the electrical efficiency and the durability of the different fuel cells used for power production to levels which can compete with conventional technologies, while reducing costs

Topic(s)

FCH-02.3-2014 - Stationary fuel cell system diagnostics: development of online monitoring and diagnostics systems for reliable and durable fuel cell system operation

Call for proposal

H2020-JTI-FCH-2014-1

See other projects for this call

Funding Scheme

FCH2-RIA - Research and Innovation action

Coordinator
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**Participants (10)**

**UNIVERSITA DEGLI STUDI DI SALERNO**
- Address: Via Giovanni Paolo II 132, 84084 Fisciano Sa, Italy
- Activity type: Higher or Secondary Education Establishments

**AALBORG UNIVERSITET**
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- Activity type: Private for-profit entities (excluding Higher or Secondary Education Establishments)

**EIFER EUROPAISCHES INSTITUT FUR ENERGIEFORSCHUNG EDF KIT EWIV**
- Address: Emmy Noether Strasse 11, 76131 Karlsruhe, Germany
- Activity type: Research Organisations
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