Fluid Management component improvement for Back up fuel cell systems

Results in Brief

New improvements back up fuel cell operation

While fuel cells continue to improve in performance over time, durability and performance of auxiliary equipment that help ensure reliable operation have not followed the same trend. Improvements in balance-of-plant (BoP) equipment could someday ensure that fuel cell power systems will be the answer in blackout-hit regions in Africa, the EU and the United States.

ENERGY

© Thinkstock

Backup fuel cell systems provide power during outages. This is quite a challenge, especially for BoP components of these systems. These components must be reliable under tough operating conditions such as extreme temperatures, humidity and dust for blackout periods of around 1 000 hours a year.

Current BoP components are not specifically developed for fuel cell systems, thereby reducing reliability of the entire fuel cell system in case of a blackout.

Technological improvements in BoP components within the scope of the EU-funded project FLUMABACK (Fluid management component improvement for back up

fuel cell systems) should enable significant enhancements in performance of the components as well as the entire system.

The team focused on optimising performance of the air blower, hydrogen recirculation blower, humidifier and heat exchanger with regard to the stack requirements. All components were optimised to achieve operating time of 10 000 hours without any need for additional maintenance. However, fine-tuning of all system components is necessary to ensure optimal operation of the entire fuel cell system.

Two different systems were developed with rated output of 3 and 6 kW, and the same BoP components could operate in both systems. Project members conducted numerous tests on these systems using prototypes of the newly developed BoP components. The main requirements and benchmarks were met for both fuel cell systems, showing that component integration was successful. Increased efficiency and reduced costs are the main advantages of the new fuel cells.

Experimental testing of the systems provided data for developing a numerical model of the components and the entire fuel cell system. This model offers the possibility to test the system under specific conditions and various operating regimes.

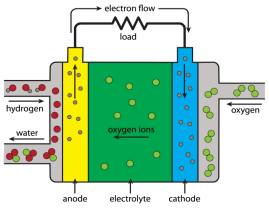
With improvements in the design and operation of BoP components in backup fuel cell systems, FLUMABACK helps overcome reliability issues that have been holding back market uptake of fuel cells. Except for backup fuel cell systems for power applications, component improvements also target fuel cell electric vehicles and small-scale generation of heat and electric power.

Keywords

Fuel cells, balance-of-plant, power, blackout, FLUMABACK

Discover other articles in the same domain of application

Reduced risk for SMEs contemplating energy efficiency



Automation drives cheaper fuel cell technology

Integrated tool helps local government draw up district heating networks

POWERED BY NH3

Sailing towards zero emissions with ammonia

Project Information

FluMaBack

Grant agreement ID: 301782

Project website

Project closed

Start date
1 July 2012

End date
30 June 2015

Funded under
Specific Programme "Cooperation": Joint Technology Initiatives

Total cost
€ 3 999 005,80

EU contribution
€ 2 482 969,20

Coordinated by

ELECTRO POWER SYSTEMS MANUFACTURINGSRL
Italy

Last update: 27 June 2016

Permalink: https://cordis.europa.eu/article/id/150523-new-improvements-back-up-fuel-cell-operation