
FUEL CELL SYSTEM FOR AN ENERGY SELF-SUFFICIENT TELECOM-STATION



Ulf Groos, Wolfgang Koch, Stefan Keller

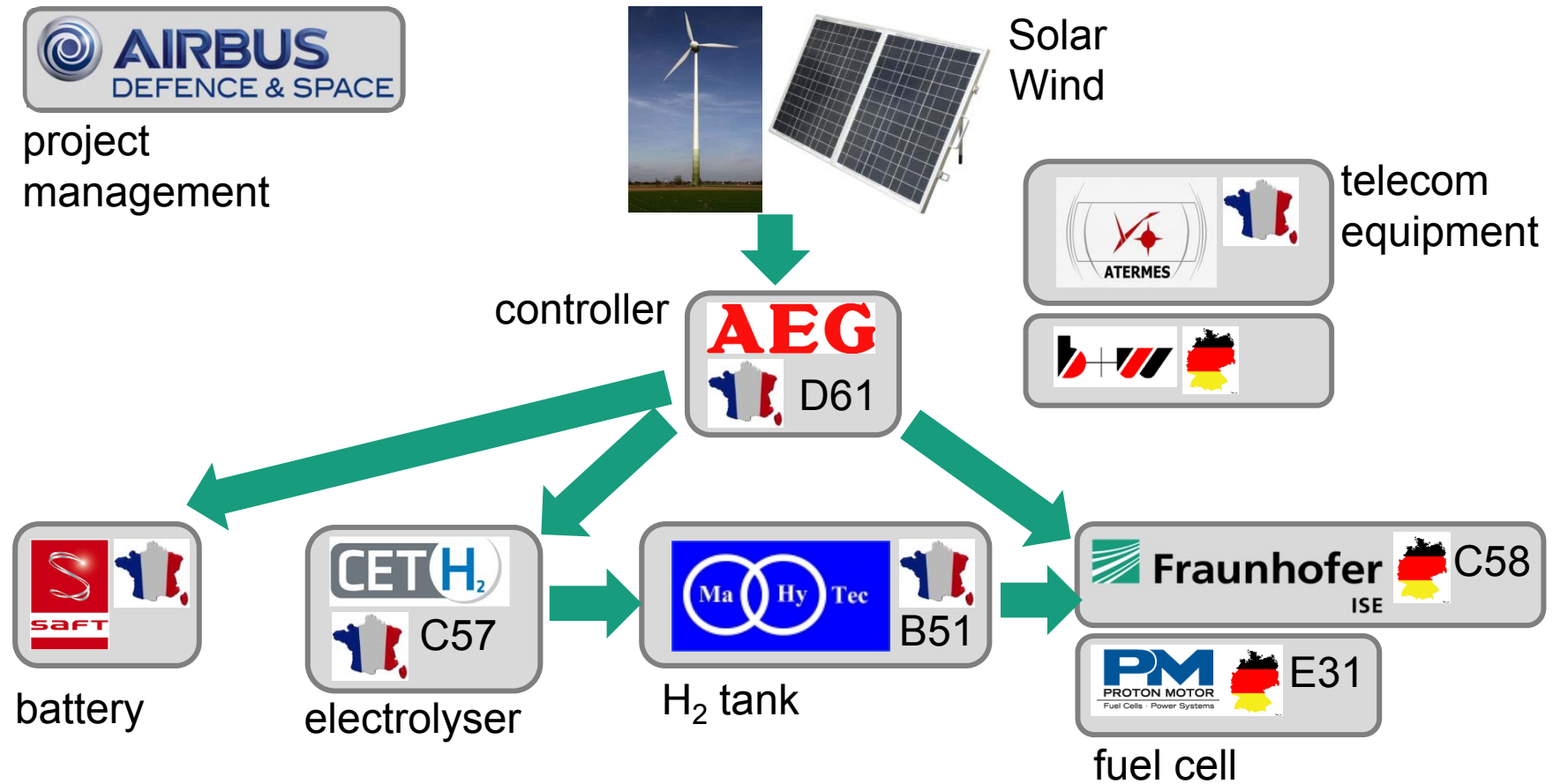
Fraunhofer Institute for Solar Energy Systems ISE

Technical Forum,
Hannover Trade Fair

Hannover, April 8th 2014

www.h2-ise.com

A French-German approach



Power supply completely based on regenerative energy

- 1 kW 24/7 over 20 years
- maintenance 1 per year
- world-wide at any place



Our LT PEM fuel cell shows a netto efficiency of 46%.

- Nominal power output of 1,5 kW_{el}
- Commercial, liquid cooled LT PEMFC stack of Proton Motor
- H₂ recirculation with jet pump
- Particle filter of cathode air
- 440 x 563 x 315 cm³ (L x B x H) for a 19" rack integration, 50 kg
- Temperature range -15 °C to +50 °C
- 10 s start-up time and 31 s until nominal power

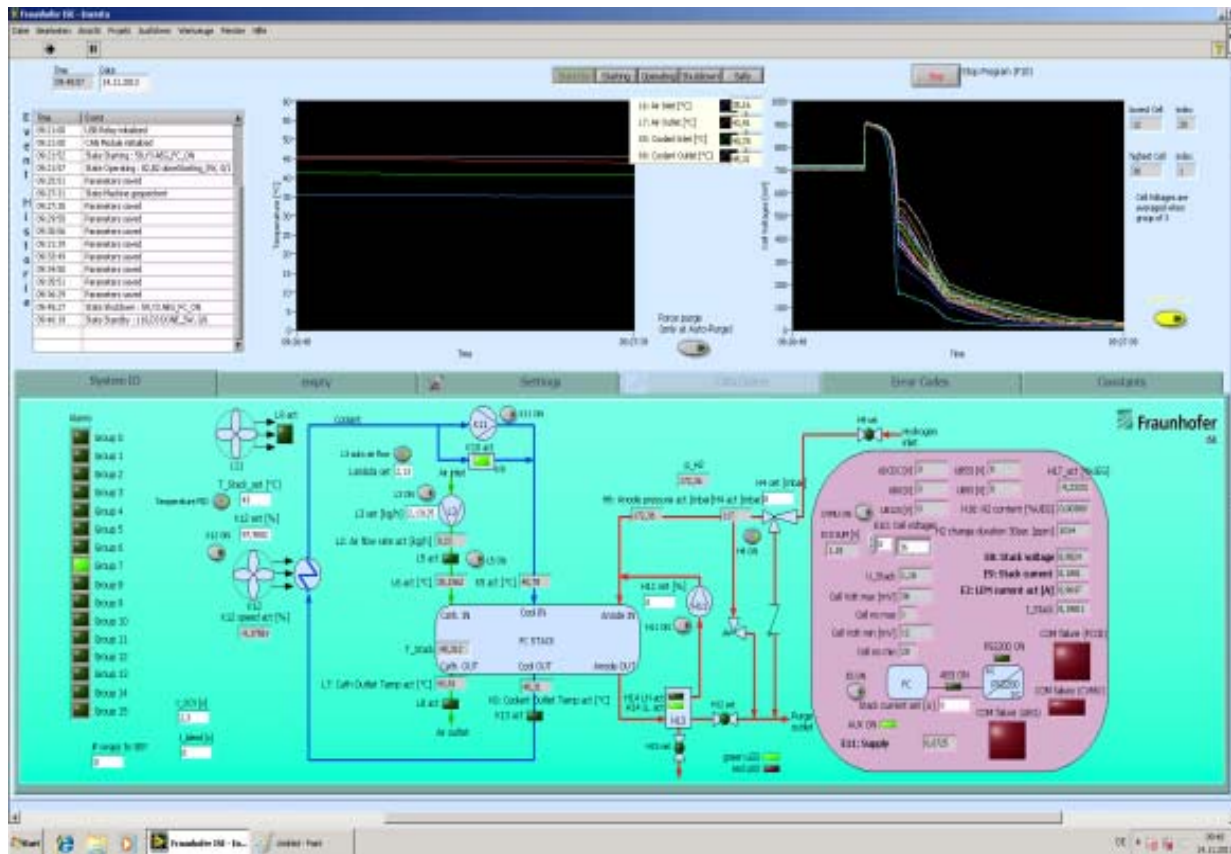


System architecture with fuel cell and controller module



- Controller module with industry PC for fuel cell control and communication with system master controller, a 24 V DC-DC converter for peripheral components, and a 48 V DC-DC converter for the telecom bus.
- The fuel cell system is packaged by E-PAC[®] foam technology for easy assembly and maintenance. This allows also a defined flow of cooling air, a good thermal isolation, and mechanical protection.

The fuel cell control was developed in LabView and can be monitored remotely.

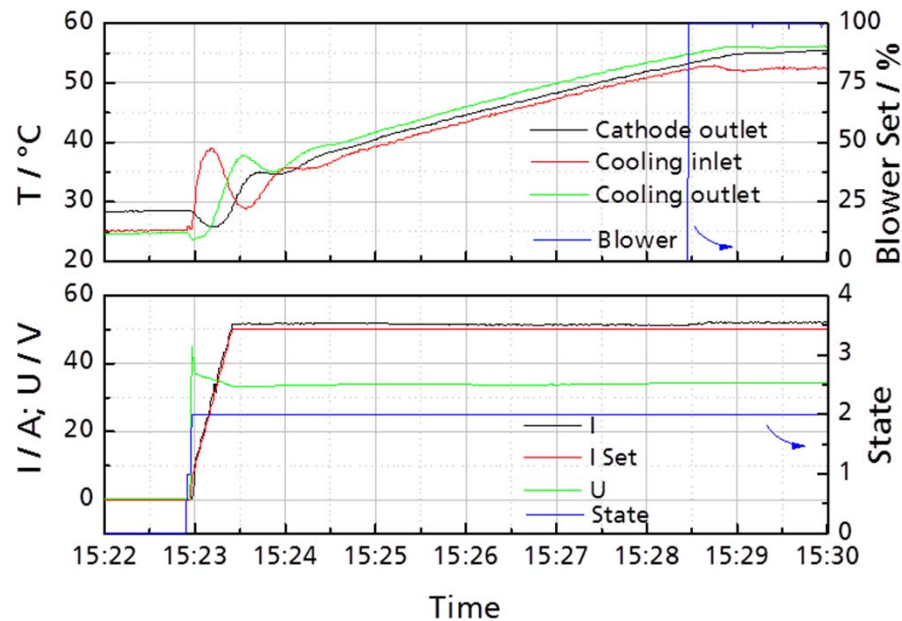


- Control parameters were fitted according to various climate conditions

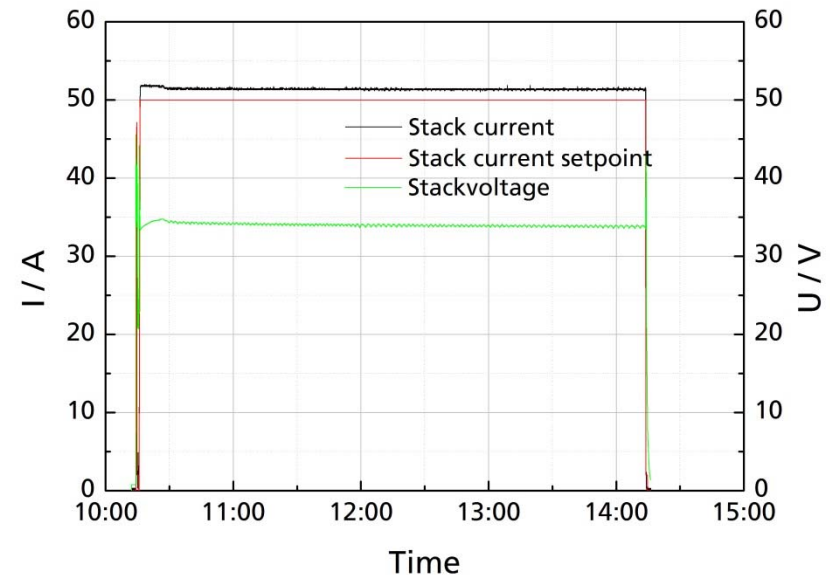
The fuel cell is being tested intensively at climate conditions from $-15\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ and 10% r.H. to 95% r.H.



Tests over 100 h as well as 300 starts and stopps at extreme climate conditions show the reliability.



System start-up: nominal power after 31 s; max. T difference 4 K between cooling in- and outlet



Test at +40 °C and 10% r.H. shows continuous power over 4 h.

Thank you very much for your attention!



Fraunhofer Institute for Solar Energy Systems ISE

Ulf Groos
Head of Department Fuel Cell Systems

www.h2-ise.com
www.ise.fraunhofer.de
ulf.groos@ise.fraunhofer.de

