

ENERGY

eneramic® – START OF THE COMMERCIALIZATION

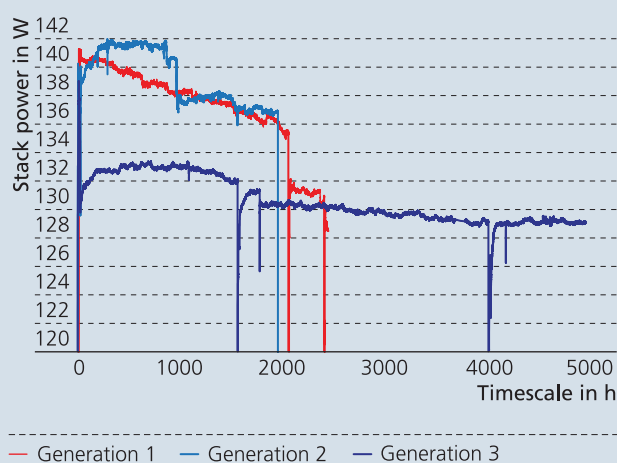
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Under the trademark of eneramic®, Fraunhofer IKTS has developed a complete, SOFC-based technology platform for mobile power supply from commercially available liquefied petroleum fuels (LPG). Starting from the vision of an efficient and robust off-grid power supply device and based on the wide range of SOFC competence of Fraunhofer IKTS, a new, patented system solution in the power range from 50 to 500 W_{el} was developed with financial support of the Fraunhofer Future Foundation. During the technological development phase, the demands of potential entry-level markets were defined for the first prototypes with the help of industrial partners. Now, the system is going to be tested under real life applications. The test experiences will be considered in the first eneramic® product which will be commercially available in 2015.

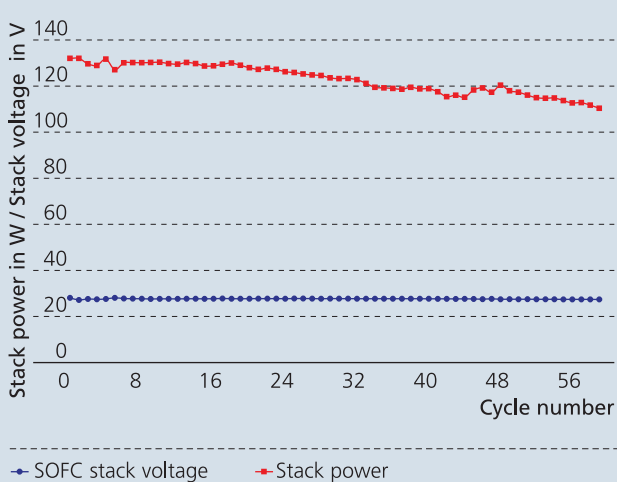
Development status of the technology platform

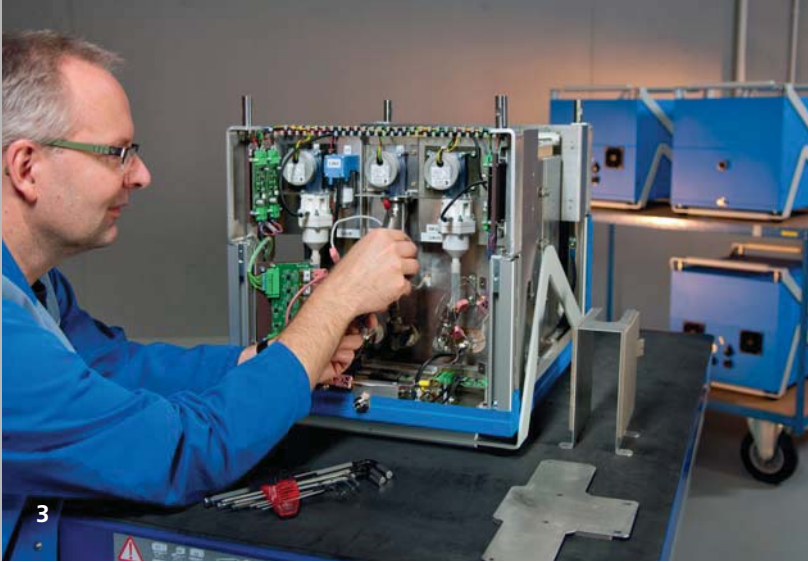
The prototypes have repeatedly shown a high degree of maturity in the laboratory scale. Stationary long-term tests of the system platform up to 5000 hours show little losses due to aging, and offer advantages over competitive technologies such as lead batteries. In the meantime, the third generation has a performance degradation of less than 1 % per 1000 hours. So, the requirements with regard to lifetime (10,000 hours with P_{el} > 100 W) can be met. Considering the start-stop capability, the lifetime of the system prototypes has been enhanced up to 65 cycles with low power losses by adjusting the operation mode (Figure 2). The prototypes are assembled using reliable and reproducible processes including the necessary quality assurance for the components and complete systems.

Comparison of different system generations in terms of operation-related power losses



Power losses of the prototypes due to SOFC ageing during start-stop cycles





Field test phase

As battery hybrid, the system is suitable for different leisure and industrial applications, and represents an efficient and long-living alternative to existing technologies as well as other fuel cell types. In 2014, the promising results obtained from tests in the laboratory and outdoor will be validated for different entry-level markets by means of field tests. For this purpose, the eneBox (figure 4) was built containing the gas bottles and buffer batteries. Additionally, it is a protection against vandalism and other outside influences.

Start of the commercialization

Within the scope of technology development, the requirements for the commercialization of the technology and potential products were extensively evaluated. The analysis included:

- Technical and functional specifications for commercial standard products as basis for the evaluation of maturity and as development interface of the market needs
- Market segmentation and analysis
- Comparison with competitors
- Consideration of value chains and make-or-buy decisions in the production process
- Design to cost – introduction of a value-engineering process to identify and analyze cost reduction potentials

As a result of the analysis it was found that the market segment of 100 W electrical power is a very attractive starting point for the market launch. Commercial standard products can be a cost-effective solution for off-grid power supply in this power range due to the selected LPG fuel, the good electrical efficiency, the long lifetime and the low maintenance costs.

- 1 System lab-tests with traffic light application.
- 2 System prototype of the third generation.
- 3 Prototype production.
- 4 System demonstration during presidential visit of Mrs. Park.