



Name of project: Lohgerberhaus  
 Typology: Hotel  
 Location: Balve, Germany

Building owner: Lohgerberhaus Ferienwohnungen  
 Adalbert Allhoff-Cramer, Balve  
[www.aparthotel-mammut.de](http://www.aparthotel-mammut.de)

Completion:
 

- Historic building of 1790
- Restoration in 1989
- Installation of the fuel cell in 2014

Facilities planner: J. u. F. Kleinschmidt Bauklempnerei und  
 sanitäre Anlagen, Arnsberg

European field test  
 ene.field:
 

- End of 2013: Beginning of planning
- July 2014: Starting up the fuel cell,  
 beginning of the field test
- July 2017: End of the field test,  
 report

Rainer Schäfer Heizung Sanitär, Balve,  
[www.schaeferbalve.de](http://www.schaeferbalve.de)

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 Vaillant

Vaillant products: Solid Oxide Fuel Cell, SOFC, current  
 research and development project

The good feeling of doing the right thing.

The listed Lohgerberhouse in the centre of Balve is a half-timbered, slate-clad house from the year 1789. Since 1986, the property, which was then in danger of being torn down, was painstakingly restored in several phases. Today it is called the "**Aparthotel Mammüt**" and houses five holiday flats and a function room. In 2014 the Lohgerberhaus was renovated to improve its energy efficiency. **The old gas heaters were replaced by an innovative solid oxide fuel cell from Vaillant to investigate the everyday suitability of the new technology as part of the European ene.field field test.**

The listed Lohgerberhaus from 1789 is in the historic centre of Balve, a small town in Hönnetal, Sauerland. After a large urban fire, which nearly destroyed the entire town, the building was constructed by the forefathers of the owner on the foundations of an old farmhouse. The building, which - as the name suggests - was used as a tannery and at the beginning of the 19th century also as a tavern was used for farming into the 20th century. The entailed estate at the end of the Alte Gerichtsstraße road, which was supposed to be torn down to improve the guidance of traffic within the town, has, since 1986, been painstakingly restored in several phases. From 2010, the property which until then had been used by the "Heimwacht" (Home Guard) club as a holiday residence. Now called the "Aparthotel Mammüt", it houses five holiday flats with 20 beds and a function room. In 2014 the existing gas heaters were replaced by an innovative fuel cell from Vaillant. The historic Lohgerberhaus is now one of 1,000 European residential properties to take part in the ene.field field test to research the everyday suitability of fuel cells.

#### Historic monument

The Lohgerberhaus is a two-storey, half-timbered house clad with slate on the eaves side, a long hall, as well as a living area built subsequently over the old town moat with cellar below in the rear section. The basement was built with solid materials, the gable side is equipped with timber angle braces and foot braces. In the 19th century the height of the building was increased and it was equipped with new half-timbered gables. Since the renovation, the hall, which has now been expanded through the areas of the former workshop and stalls, can be rented as a function room. The approximately 80 m<sup>2</sup> room is influenced by the internal load-bearing half-timbered construction and the retained old "cow beam", a heavy crossmember. The rooms of the holiday apartments are furnished in the original style, and are characterised by the charm of many elements from the construction period, such as rustic oak beams or antique oak doors. During the renovation, historic inscriptions and flatly cut leaf ornaments which adorn the old hall gate, the historic entrance portal, were preserved.

#### Energetic renovation and European ene.field field test

To prepare the Lohgerberhaus for use as holiday apartments for the future too, it was necessary to renovate the building to improve its energy efficiency. Due to its listed status, however, external insulation was out of the question. Instead of minimising the energy losses, the new energy concept is therefore based on optimising energy production. The four existing, over 25-year-old gas heaters as well as a storage heater in the attic flat were no longer sufficient and partly defective. The replacement of the heaters with newer appliances would only have been approved with a central exhaust and air pipe via the chimney. However, this would have interfered considerably with the structure of the half-timbered house. Another challenge for the new energy concept was the sharp differences in heating requirements through its use as a holiday home - consumption is not constant. **The future-orientated solution was to install a fuel cell system in a dry room of the cellar. As part of the European ene.field field project, fuel cell heaters made by various manufacturers have been installed in residential properties as a test which will last three years. A solid oxide fuel cell (SOFC) from Vaillant was installed in the Lohgerberhaus.** It has a rated electrical output of 1 KW with heating power of 2 KW. Vaillant developed the technology together with the partner company sunfire. **The micro power heat coupling fuel cells from Vaillant are still in the test phase. Since the initial operation of the fuel cell in the Lohgerberhaus in July 2014, it has not only met basic electricity requirements, but also feeds surplus energy into the grid.** When there are spikes in demand, energy is purchased from a green power supplier. At the end of the test phase in July 2017 the test device will be replaced by a conventional CHP system or by a new fuel cell. The goal of the project is to investigate the development of fuel cell technology under real conditions in a long-term test and to guide the appliances to series production.

#### Fuel cell technology from Vaillant

Vaillant is currently testing SOFC fuel cell heaters with a simple and robust system structure, which produce enough electricity and heat for a single-family home. The SOFC acronym stands for solid oxide fuel cell. They convert chemical energy directly into electrical energy with the help of electrodes, which are separated by electrolytes. The electrolyte consists of a solid ceramic material, which conducts oxygen ions, though has an insulative effect for electrons. To achieve the required performance, the cells are piled into stacks. When the fuel cell heater is connected to the natural gas grid, a reformer initially converts the natural gas into a hydrogenated gas. This then reacts in the fuel cell stack with the oxygen in the air in a silent electrochemical reaction, which creates electricity and heat. After sampling all technologies of interest for fuel cell heaters, Vaillant had now developed and tested 5 generations of the promising SOFC technology.

The Lohgerberhaus is a successful example of how a historic building can become a futuristic pioneer of energy efficiency. To achieve its environmental goals, the German state wants to increase the percentage of electricity gained from combined heat and power to 25% by 2020. The innovative fuel cell technology could become the spearhead of the CHP systems because in comparison to regular work-sharing electricity and heat production, it consumes up to 25% less primary energy and reduces CO<sub>2</sub> emissions by up to 50%.