

Press Release

15 February 2018



The building shell of the Klinikum Frankfurt Hoechst in early February 2018. Interior design of the Passive House hospital is currently underway. A test phase will follow scheduled completion next year. © Klinikum Frankfurt Hoechst

Passive House hospital progressing

Visitors are impressed by the Klinikum Frankfurt Hoechst construction site

Darmstadt/Frankfurt, Germany. The world's first hospital designed to the Passive House Standard is currently under construction in the Frankfurt district of Hoechst. The hospital's building shell has already been completed, now the interior finishing is underway. The construction of this highly energy efficient hospital should be completed by next year, followed by a test phase lasting several months before the building goes into full operation. The Passive House Institute in Darmstadt has been advising on the project since the design phase and will continue with its consultancy services throughout the entire duration of construction work.

Tours booked out quickly

The impressive construction site in Frankfurt Hoechst is the biggest in the city of Frankfurt and can be seen from a great distance. After all, the future hospital building is 143 metres long and over 23 metres tall. Besides the basement and ground floor, there are a further six storeys. Following the symbolic groundbreaking ceremony in summer 2016, the foundation stone was laid in November of the same year. The complex's building shell was completed just a year later in autumn 2017. The helipad on the roof will be set up this spring. Tours offered by the hospital authorities in autumn last year were quickly booked out.



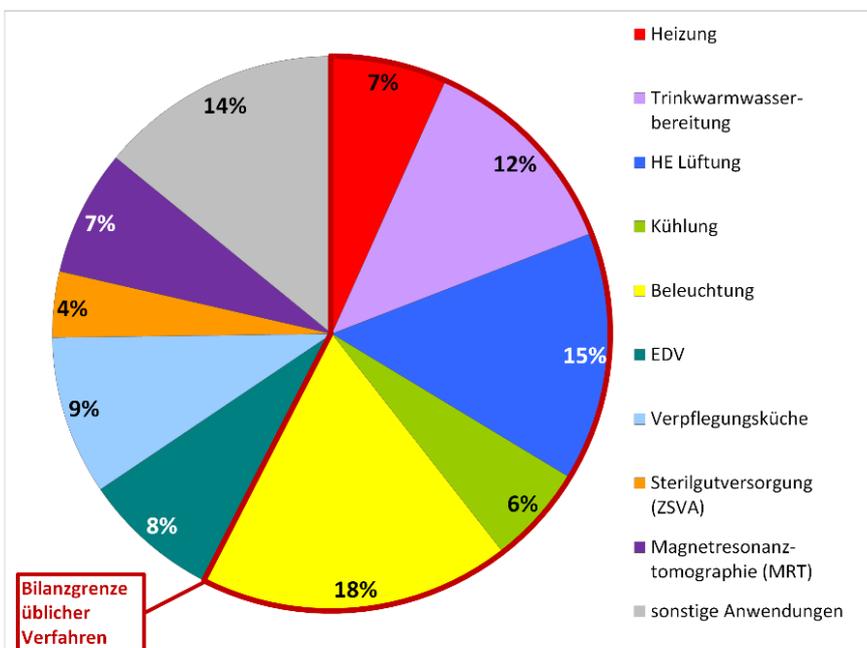
Exterior view of the new building in Frankfurt. According to the new plans, unobtrusive shades will be used for the façade. The total length of the hospital building is 143 metres and it stands over 23 metres tall. © wörner traxler richter

Pleased with the progress

Karsten Valentin, Managing Director of the Zentrale Errichtungsgesellschaft (ZEG) and responsible for the new hospital building, is satisfied with the construction progress. Despite the complex planning for technical building equipment, everything is going according to plan. After completion of the building, a test phase of several months is planned. This is essential to ensure the smooth day to day operation of the new hospital.

Interior finishing is well underway

The new building will have 664 beds and further capacity for 40 beds in the outpatient clinic. Ten operating rooms and one hybrid operating theatre for minimally invasive surgery are foreseen for the first floor. The sixth floor extends only across a part of the building and will accommodate the technical systems. About 400 construction workers are currently working on the interior finishing, including the laying out of model rooms. The installation of the more than 1000 triple-glazed windows has begun.



Reduced running costs

The Klinikum Frankfurt Hoechst aims to achieve two main goals with the new building. The first is to optimise the internal operational processes and thereby significantly shorten the distances within the building for staff. Secondly, since the building will replace the current outdated building from the 1960s, running costs should be reduced significantly.

If the energy demand of the hospital is determined in the conventional way, almost half of the future energy demand is disregarded by the planners. The computer equipment as well as the magnetic resonance imaging equipment alone account for eight and seven percent of the energy expenditure respectively. © Passive House Institute

Description from top: Heating, hot water generation, ventilation, cooling, lighting, computer equipment, hospital catering, sterile supply, magnetic resonance imaging equipment, miscellaneous, "Bilanzgrenze üblicher Verfahren" - balance boundary with conventional methods.

Passive House concept pays off

Due to their intensive 24-hour use, hospitals consume large amounts of energy. From the accident and emergency department and operating theatre to patient rooms, numerous technical devices are in continuous use and the lights are on practically all the time. "In addition to providing improved comfort, the Passive House Standard is designed to reduce the energy demand considerably. Therefore this energy efficient concept is particularly valuable for hospitals with their high energy demand," explains Oliver Kah of the Passive House Institute.

Improved thermal comfort

As a scientist, Kah is consulting on the project with a focus on energy efficiency. Among other things he checks whether the planned building components comply with the required level of thermal protection.

Need of modernisation

In a [baseline study](#) carried out prior to the pioneering project in Frankfurt-Hoechst, Oliver Kah and his colleagues examined how the highly energy efficient Passive

House concept can be implemented in hospitals. Of the roughly 2100 hospitals in Germany, many are in need of modernisation and could profit from this study. The study made it clear that hospital equipment has a major influence on the energy demand and must be considered to its full extent. Generally speaking, the electricity consumption in a hospital is three to four times higher than that of a residential building.

Hygiene-relevant requirements

At the same time, the implementation of the Passive House Standard in hospitals must meet special requirements, for instance regarding operating theatres. "Hospitals have extremely high hygienic requirements, including how exhaust heat from surgery areas is to be utilised," explains Oliver Kah.



The existing building of the Klinikum Frankfurt Hoechst built in the 1960s. Among other things, the new Passive House Standard building will drastically reduce running costs. © Klinikum Frankfurt Hoechst



Besides improved comfort, the Passive House Standard is designed to significantly reduce the demand for energy, which is particularly valuable for hospitals with their high energy demand. © Klinikum Frankfurt Hoechst

Energy-intensive hospitals

Conventional verification methods only take the energy demand for heating and cooling, ventilation, water and lighting into consideration. "However, the distribution of energy shows that hospitals are usually equipped with more devices and have energy-intensive processes. If the energy demand is calculated using conventional methods, almost half of the future energy demand remains unconsidered," says Kah.

Computer equipment and MRT

The computer equipment and magnetic resonance imaging devices alone account for eight and seven percent of the energy applications, while the sterile supply accounts for a good four percent. Kah explains: "At the same time, energy efficient devices are particularly advisable in hospitals; as well as saving energy, these also reduce the cooling demand."

High level of thermal comfort

The Passive House hospital will also meet the needs of patients and visitors. In patient rooms, a higher temperature is perceived as comfortable by the patients. In the hospital in Hoechst, the temperature in patient rooms will be 22 degrees Celsius. Due to the good level of thermal protection, the higher room temperatures can be met with a lower energy demand. In addition, high differences between the surface temperatures and room temperatures will be avoided thanks to the improved thermal insulation and the triple-glazed windows. As a result, thermal comfort in the patient rooms will increase.

Fresh preheated air

The ventilation system with heat recovery which is present in every Passive House building ensures that fresh preheated air constantly flows into the rooms. In addition, unpleasant odours are efficiently removed by the ventilation system. Of course, it will still be possible to open the windows in the Passive House hospital. Furthermore, the baseline study also showed that despite the higher indoor temperature and the higher air change rate of the controlled ventilation system, the heating demand can be limited to 15 kilowatt hours per square metre of treated floor area per year (kWh/(m²TFA a)) using the appropriate measures.

Demolition of building

The costs for the replacement building of the Klinikum Frankfurt Hoechst are estimated at 263 million Euros. The German state of Hesse is contributing around 55 million Euros towards this energy efficient construction. The existing building dating from the 1960s will be demolished after the Passive House hospital starts operating. Two further construction stages are planned on the site.



To avoid thermal bridging, a layer of thermal insulation is laid between the end wall of the hospital building and the brickwork above it (roof parapet).

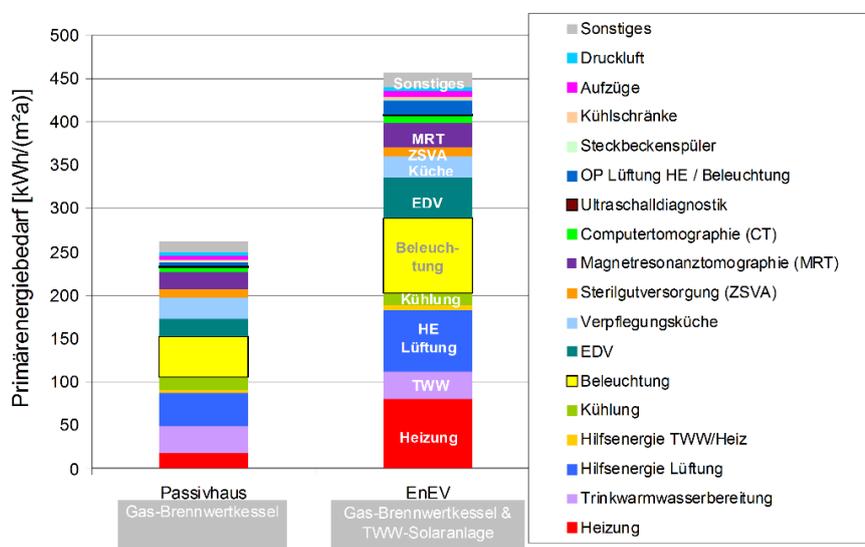
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Largest paediatric centre in region

The Klinikum Frankfurt Hoechst is a maximum care hospital and is part of the Kliniken Frankfurt Main-Taunus GmbH, which is the largest communal hospital network in the region. Of the 22 clinics, institutes and specialist departments, each year more than 36,000 in-patients and 80,000 outpatients are treated in Frankfurt-Hoechst alone. The hospital is also considered to be the largest paediatric centre in the region. The Klinikum Frankfurt Hoechst has over 2,000 employees. Nursing and health care professionals are trained here in five schools.

Impressive projects at the Passive House Conference

The construction of the Passive House hospital in Frankfurt is receiving widespread interest also outside of the Rhein-Main region. Many professionals, particularly from Europe and North America who are involved in energy efficient buildings in the health sector, have shown their interest. One of the focal points at the **International Passive House Conference in Munich** will be the interesting projects worldwide which have been built to the Passive House Standard. From 9 - 10 March 2018, experts from all over the world will convene at the MOC in Munich to present projects, products and solutions for energy efficient construction and retrofits, including from Germany, Europe, the USA, China and also Mongolia. www.passivhaustagung.org



Significant potential for reducing energy consumption exists in hospitals especially with regard to facilities, e.g. medical equipment. This chart shows the main energy uses in a hospital as an example.

If energy efficiency is kept in mind for all areas, from the building envelope to the medical appliances, as recommended for a Passive House hospital, then about 40 to 60 percent of the energy can be saved when compared to a conventional new construction. The energy efficient products required for such savings are already available. © Passive House Institute

General information

Passive House

A Passive House is a building that does not require any conventional building heating on account of its excellent thermal insulation. Such buildings are called "passive houses" because a major part of their heating demand is met through "passive" sources such as solar radiation or the waste heat from occupants and technical appliances. A Passive House thus consumes about 90 percent less heating energy than existing buildings and 75 percent less energy than an average new construction.

Passive House & COP23 in Bonn

The United Nations (UN) explicitly mention Passive Houses as a possibility to increase the energy efficiency of buildings and thus reduce global warming in "The Emissions Gap Report 2016".

Pioneer Project

The first Passive House in the world was built in Darmstadt-Kranichstein (Germany) 25 years ago by four private homeowners on their own personal initiative. Ever since the homeowners moved in with their families in 1991, these terraced houses have been regarded as a pioneer project for the Passive House Standard. 25 years later, building physicists have attested to the unimpaired functioning of the first Passive House and its unchanged low heating energy consumption. With its newly installed photovoltaic system, the world's first Passive House now utilises renewable energy and received the Passive House Plus certificate for this reason.



© Peter Cook

Passive House and renewable energy

The Passive House Standard can be combined well with on-site renewable energy generation. Since April 2015, the new building classes "Passive House Plus" and "Passive House Premium" have been available for this supply concept.

Passive Houses worldwide

Passive Houses buildings for all types of uses now exist everywhere. In addition to residential and office buildings there are also kindergartens and schools, sports halls, swimming pools and factories built as Passive House buildings. The first Passive House hospital in the world is currently being built in Frankfurt am Main. Interest in Passive House is growing. In view of the consumption of resources in industrialised countries and the need to contain global warming, municipalities, businesses and private people are increasingly implementing new constructions or retrofits to the Passive House Standard.

Passive House Institute

The Passive House Institute with its headquarter in Darmstadt (Germany) is an independent research institute for highly efficient use of energy in buildings. Dr. Wolfgang Feist is the founder of the institute. It holds a leading position internationally with regard to research and development in the field of energy efficient construction. The Passive House Institute is the organizer of the International Passive House Conference and the related exhibition. The next Passive House Conference takes place 9 - 10 March 2018 in Munich, Germany.



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The latest news on the subject of Passive House: www.twitter.com/IGPassivhaus

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