

The Passive House Institute closely examined different extractor hood systems especially in airtight buildings. The scientists also examined the minimum extract air volume that is necessary for collecting a specific amount of vapours (fumes).  
Picture: Pixabay

## Plenty of steam around extractors

**Passive House Institute examines extractor hood systems in energy efficient buildings**

**Darmstadt, Germany.** In a new study, the Passive House Institute focuses on systems for vapour extractors, with the research report also resulting in a handbook for extractor hoods in Passive House buildings. This contains the key principles for a compatible system and its dimensioning. Research findings will be presented during the Passive House Conference "Achieve Better Buildings!" on 3 and 4 May 2019 in Heidelberg. The Institute will also present the findings at the 23<sup>rd</sup> International Passive House Conference in China in autumn 2019.

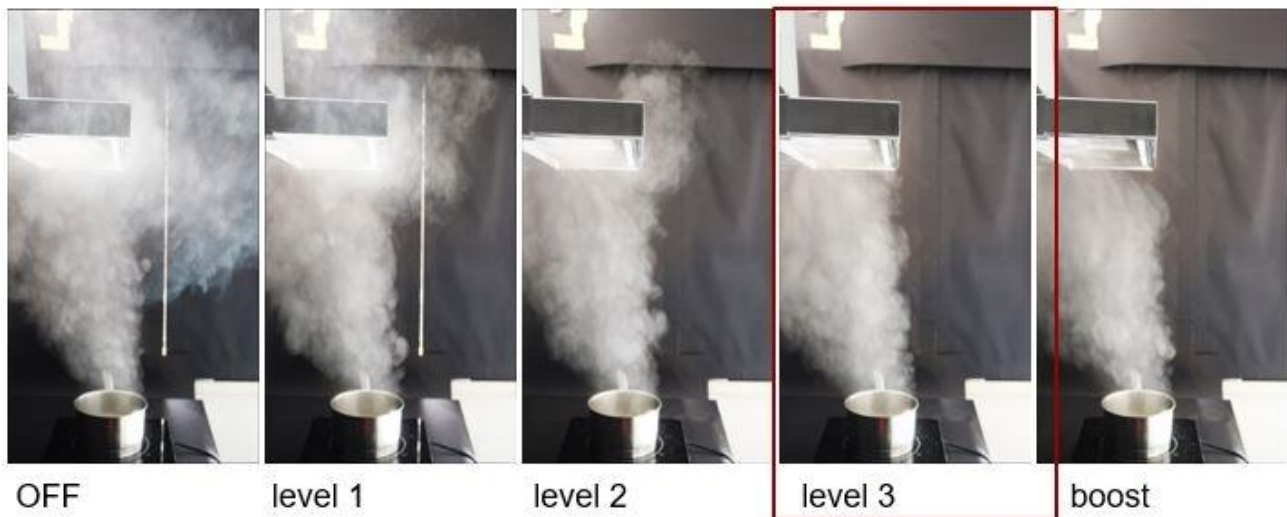
In view of greater energy efficiency of buildings and increased demand for thermal comfort by occupants, the scientific focus has shifted to extractor hoods particularly in airtight buildings. Oliver Kah and Kristin Bräunlich of the Passive House Institute evaluated the various extractor hood systems together with the ITG Institute for Building Systems Engineering in Dresden, the IHD Dresden Institute for Wood Technology, and the company Naber GmbH. The interaction of the extractor systems with the building was also studied.



The experimental setup for vapour collection in the kitchen studio. Picture: PHI

### Wall mounted hoods take precedence

"The design of the extractor hood and its position in the room have considerable influence on the amount of vapours collected and the volume flow rate that is necessary for this purpose", explains Oliver Kah of the Passive House Institute. The results indicate for example that already at lower operating stages the amount of fumes captured by extractor hoods mounted on the wall (recirculation air and extract air) is comparable to that of cooktop extractors.



This series of photographs visualises the differences between the capture of vapours (fumes) at different operating stages. The type and quality of the extractor system also has an effect on the amount collected. The ventilation system shown here collects the vapours completely already at the operating stage 3. Series of photographs: Passive House Institute

### Circulation air is preferable

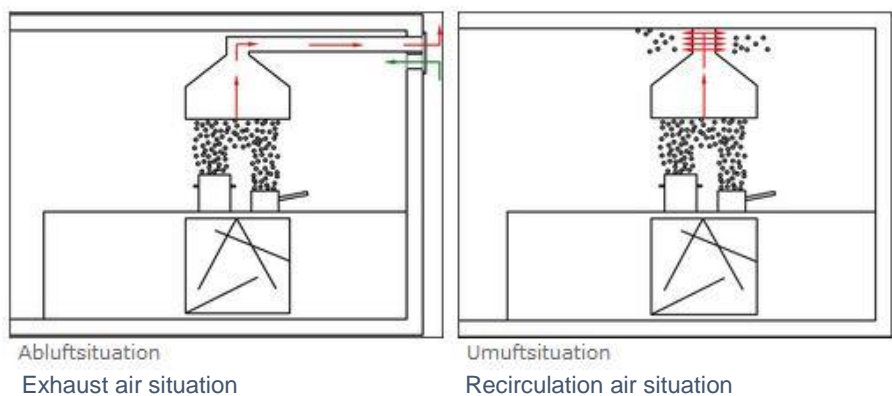
In buildings with a very small heating demand, such as Passive Houses, the Passive House Institute recommends the installation of recirculation air hood systems. Exhaust air hood systems may increase the heating demand of energy efficient buildings significantly; in addition, it is usually easier to integrate recirculation air systems. The tests also showed that in combination with a home ventilation system, the results achieved by good recirculation air hood systems are almost similar to those obtained with exhaust air systems with reference to the reduction of odours.

### Removal of moisture

Unlike exhaust air extractor hoods however, recirculation air hoods do not remove the moisture arising during cooking. Basic ventilation is therefore recommended for the adequate removal of moisture in kitchens. "In Passive House buildings and frequently also in other energy efficient buildings, controlled ventilation constitutes a part of the building concept in any case. Thus adequate basic air exchange is already ensured in these buildings, due to which the moisture loads are removed", explains Kristin Bräunlich of the Passive House Institute.

### Hardly any cost differences

There are hardly any differences when considering the overall costs for the exhaust air and recirculation air systems: while annual costs for replacing the active carbon filter are incurred with the recirculation air systems, exhaust air systems cost slightly more due to the installation costs



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and incur higher heating energy costs caused by the additional ventilation heat losses.

## Essential for exhaust air hood systems

For buildings with extremely low heating demands such as Passive House buildings, the Passive House Institute recommends the installation of recirculation air hood systems. However, if an exhaust air system is installed, then attention should be given to the following points:

- Solutions should be provided for incoming air flow.
- The exhaust air outlet and air inlet must be equipped with airtight seals. Non-return valves are usually insufficient.
- Preference should be given to systems which ensure adequate air capture using moderate exhaust air flows.
- In smaller homes the additional ventilation heat loss may increase the specific area-related heating demand and also the heating load significantly. Exhaust air extractor hood systems are therefore not advisable in buildings with mainly smaller dwelling units.

This research on extractor hood systems in energy efficient buildings was funded by the research initiative "Future Building" of the German Federal Institute for Research on Building, Urban Affairs and Spatial Development (reference number : SWD-10.08.18-7-17.27).

## Presentation in Heidelberg

The research report on extractor hoods in combined kitchen and living areas and the handbook resulting from this will soon be available on the Passive House Institute homepage to **download free of charge**.

The latest research results will also be presented by the Passive House Institute at both their upcoming Passive



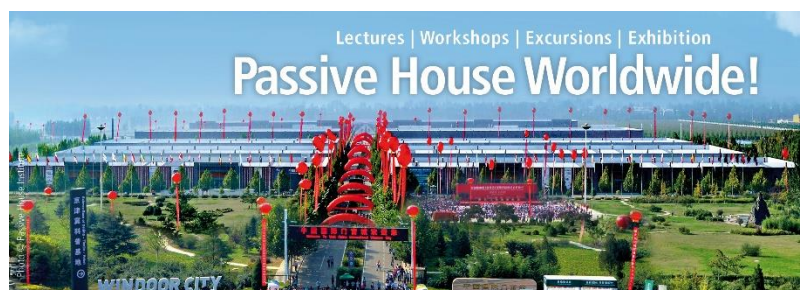
**ACHIEVE BETTER BUILDINGS!**  
**Passive House Conference Heidelberg 2019**

House conferences. During the Passive House Conference "**Achieve Better Buildings!**" on **3 and 4 May 2019 in Heidelberg**, the [presentation on extractor hood systems](#) in the English language will be held on Saturday, 4 May 2019 starting at 11:00 a.m.

<https://heidelberg.passivhaustagung.de/en/>

## Presentation in China

In addition, analyses of the extractor hood systems in energy efficient buildings will be presented at the **23<sup>rd</sup> International Passive House Conference from 9 to 11 October 2019** in Gaobeidian in **China**.



9 – 11 October 2019  
Gaobeidian | China

**23<sup>RD</sup> INTERNATIONAL PASSIVE  
HOUSE CONFERENCE 2019**

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## General Information

### Passive House buildings

In Passive House buildings, heat loss is drastically reduced - by means of high-quality thermal insulation, an airtight building envelope and windows with triple glazing. In winter, preheated air is introduced into the building by a heat recovery ventilation system. In summer, the excellent level of insulation ensures that the heat stays outside. The five basic Passive House principles allow these highly efficient buildings to dispense with *classic* building heating. 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 heat emitted by 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 & NZEB

The Passive House Standard already meets the EU requirements for Nearly Zero Energy Buildings. According to the European Buildings Directive *EPBD*, all member states must specify requirements for so-called nZEBs in their national building regulations. These came into effect in January 2019 for public buildings and will apply for all other buildings from the year 2021.

### Pioneer project

The first Passive House in the world was built in Darmstadt-Kranichstein (Germany) 27 years ago by four private homeowners. Dr Wolfgang Feist was one of them. 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. After extensive technical testing, building physicists attest to the still unimpaired functioning of the first Passive House and its unchanged low heating energy consumption. With its newly installed photovoltaic system, the first Passive House now utilises renewable energy and received the Passive House Plus certificate for this reason.



The world's first Passive House building in Darmstadt-Kranichstein.  
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### 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. The first buildings in these two categories have already been certified, including private houses as well as office buildings.

### 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 headquarters in Darmstadt (Germany) is an independent research institute for highly efficient use of energy in buildings. The Institute founded by Dr. Wolfgang Feist holds a leading position internationally with regard to research and development in the field of energy efficient construction. Among other things, Dr. Wolfgang Feist was awarded the DBU Environmental Prize in 2001 for developing the Passive House concept.



Dr Wolfgang Feist.  
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### Passive House Conference

The Passive House conference "Achieve Better Buildings!" will be held on 3 and 4 May 2019 in Heidelberg. [www.heidelberg.Passive.Housetagung.de](http://www.heidelberg.Passive.Housetagung.de)

The Passive House Institute will also host the 23<sup>rd</sup> International Passive House Conference from 9<sup>th</sup> to 11<sup>th</sup> October 2019 in Gaobeidian, China. [www.passivehouse-conference.org](http://www.passivehouse-conference.org)

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