

Reconciling energy efficiency and comfort

July 1 2013, by Constanze Böttcher

Reducing the energy consumption of an office building does not automatically imply less comfort for the users.

The [NuOffice](#) in Munich is an office [building](#) and one of the showcases of the EU-funded project [DIRECTION](#). The first building phase was completed in 2012, the second and third will be completed in 2014 and 2015. The Fraunhofer Institute for Building Physics IBP, one of the project partners, participated in the planning of the building and was responsible for developing an efficient [energy](#) concept. Here, Michael Krause, group manager Systems Engineering at the department for Energy Systems at IBP, tells youris.com why high-energy efficiency and comfort are not mutually exclusive.

What makes the Munich showcase building so different from any other such building in Europe?

In terms of sustainability, it is one of the best buildings in Europe with respect to the certification system. The building acquired the international Platinum LEED certificate. A unique feature is the heating concept we implemented. To achieve extremely low primary [energy consumption](#) we installed an absorption heat pump operated by district heating and ground water to provide heating in winter. For cooling in summer, the system only relies on [ground water](#) without using electrical chillers. Typical [office buildings](#) have a primary energy consumption of 100 to 150 kWh/(m²a). Our aim is to reach about 30 to 40 kWh/(m²a).

To what extent did you have to compromise on comfort to achieve higher energy efficiency?

The NuOffice does not provide less comfort than a typical office building in Germany. However, there is no humidification in winter or dehumidification in summer. This may lead to some compromises in comfort. But in Germany, humidification is generally no longer carried out for office buildings because it requires very high-energy and sanitation input.

We did not install a large cooling unit, but simply cool the building efficiently with groundwater. We cannot exclude that, on a very hot day, this does not suffice. But we are quite confident that the system's power is large enough to deal with all kinds of weather conditions.

What are the technologies used that allow combining comfort and high-energy efficiency?

We installed a ventilation system with heat recovery. This ensures that the air temperature is never too warm or too cold. It also ensures complete and well-mixed ventilation of the room leading to an overall good air quality. We also have high comfort in the rooms because we heat and cool via surfaces. This leads to a very homogeneous room temperature.

Another feature is the external shading-system, which result in a good glare shield and protect the building from overheating. An additional innovative solution used for exposed parts of the building is electrochromatic glass. This new system shades the glass panels themselves in several steps as the intensity of the sun get stronger. Even when the system is turned on, it is still possible to look through the window.

Do you believe that future technology would still be able to enhance the energy efficiency?

There is always room for enhancement. Our concept was to achieve a compromise between affordability and energy efficiency. That sets the limits to insulation and glazing. People still wait for vacuum glazing to come on the market. These offer a higher thermal insulation standard.

Could the technologies and approach used in the NuOffice be replicated in residential homes?

The heating concept is not suited for single-family homes, because for very small installation, the system would be too complex and thus too expensive. But it can be used in the same way for several blocks of buildings. Also, electrochromatic glass will certainly be used in residential areas. It is an aesthetic shading system, but currently it is still more expensive than conventional blinds.

Would industrial buildings benefit from a similar approach?

Depending on the location, the same heating and ventilation system can be used for industrial buildings. But it is important to integrate the building's energy requirements, the interest of the investor and the local energy sources into a holistic concept. This is exactly what we did for the NuOffice and this can also be done for industrial buildings.

What are the brakes to higher rate of adoption of the type of technologies used in the NuOffice showcase buildings?

The heating concept is only feasible if you have district heating. Also, heating or cooling via surfaces only works if you determine beforehand that neither the need for heating nor the need for cooling is too high. If such a building were built in Southern Europe, you would have to ensure that the cooling requirements are as low as possible. For example, you would need a very good shading system.

How soon could we see these technologies more widely adopted?

In a year's time, when we have the first data available, the Fraunhofer IBP will present the [energy efficiency](#) to the public and transfer the concept to other projects. Non-research projects may also adopt the concept, not an exact replica, but certainly single aspects.

Provided by Youris.com

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