Leisure pool creates a stir

In November 2011, the "Bambados" Swimming Pool – a leisure pool built to the passive house standard – opened in Bamberg, Upper Franconia. The monitoring is starting at the beginning of April. The measurements will show whether the concept proves itself in practice and whether the planned energy savings can also be achieved in reality. In the BINE interview, Esther Gollwitzer from the Passive House Institute (PHI) discusses the concept behind the new leisure pool and draws an initial balance.

BINE Information Service: The Bambados is one of two passive house pools in Germany. What distinguishes the Bambados from other indoor swimming pools?

Gollwitzer: The holistic approach! A distinguishing feature of the passive house concept is that the entire energy consumption in the building is taken into consideration. This makes it possible to identify the correlations and interactions between the energy requirements at one point and the energy generated at another point in order to optimise the energy flows. An individual measure may cause the immediate energy requirements in one specific area to increase but overall this leads to a reduction.

Indoor swimming pools are known to be energy guzzlers. Large swimming pool complexes want to offer a Caribbean atmosphere and therefore have to be heated throughout the year. Passive house swimming pools would enable considerable energy to be saved in this respect. Which specific structural measures are particularly characteristic of passive house swimming pools?

Gollwitzer: The following measures are important: a thermally high quality building envelope with passive house components, a compact building with a southern orientation and the slide facility integrated within the building, ventilation equipment with a high heat recovery efficiency and exhaust air heat pumps, as well as effective pumps that are optimally adjusted to the different operating points for treating the swimming pool water. Well-insulated pipes minimise the distribution losses. However, the passive house concept does not finish with the construction but also covers the operation and control – particularly with complex building types such as indoor swimming pools.

In order to save heating energy, it is planned to increase the air humidity of the swimming pool to 64 per cent. This will make it possible to reduce air changes and prevent energy losses. Which prerequisites are required for this?

Gollwitzer: A basic requirement is that there are high surface temperatures for the external construction
elements. This is achieved using a thermally high quality building envelope and rigorous prevention of thermal bridges. This enables the passive house envelope to save energy in numerous ways: firstly, the transmission losses are reduced; secondly, the high surface temperature means that circulating air is no longer required, which reduces the electricity requirements. Thirdly, it is possible to have greater air humidity in the pool hall without condensation occurring on the external surfaces. This therefore reduces the dehumidification volume and thus in turn the electricity requirements and the ventilation losses. Fourthly, the reduced evaporation of the pool water means that less energy is removed from it.

Isn’t greater air humidity more uncomfortable for the visitors?
**Gollwitzer:** A characteristic feature of the passive house system is its particularly high degree of comfort. High surface temperatures, low temperature asymmetries and low airflows are particularly pleasant for lightly clothed bathers. Similarly, the humidity during operation shall be optimised in terms of saving energy and comfort. However, it should be noted that dry, lightly clothed personnel feel more comfortable in a cooler, drier climate, whereas wet bathers, on the other hand, feel more comfortable in a warmer, more humid climate.

In addition to the heating energy for ensuring comfortable indoor temperatures, another large energy load is the swimming pool and shower water. How will the consumption of warm water be reduced?
**Gollwitzer:** The increased hall humidity reduces the evaporation of the swimming pool water, which saves a considerable amount of heating energy. Lowering the water level at night (the overflow channels are switched off) reduces the evaporation even more. The specially developed overflow channels, the Bamberg Channel, were used in this swimming pool for the first time. Whether this will lead to significant savings in terms of the energy consumption for the entire building remains to be seen. Further measures: Filter treatment enables 70 per cent of the sludge water to be used again. Fittings with small flow quantities have been installed in the showers.

**Bambados has been open to visitors since November 2011 and the monitoring is about to begin, which will last for two years. Which tasks will be carried out?**
**Gollwitzer:** Bambados is a pilot project in which a series of energy saving measures have been implemented for the first time; these now have to prove themselves in practice. The measurement of all relevant energy flows, the evaluation of the measurements and the derivation of recommendations form a substantial component of this research project and are intended to provide a valuable help for future projects. Tests on the comfort and air quality will be conducted and the structural and dynamic calculation processes validated. In addition, the monitoring is essential for optimising the operation and would actually be helpful in every swimming pool. So it’s all going to be very exciting.

In 2011, a passive house swimming pool was also opened in Lünen. Which strategies were applied there in order to achieve the specified goals?
**Gollwitzer:** The Lippebad swimming pool was planned with the same concept as the Bambados pool. Worth mentioning here is the optimisation of the CHP plant, which utilises the calorific value of the CHP exhaust gas to enable heat to be used for the swimming pool. The monitoring even records the visitor flows and how long people stay in the swimming pool.

**What is planned for the future?**
**Gollwitzer:** We want to determine standard values for indoor swimming pools that can be used to measure the energy consumption of pools. Very important here are suitable reference values. For example, it is very difficult to compare the overall electricity consumption of one swimming pool with another since the services provided can be very different. It would therefore be better to have a value as to how much electricity is required for treating the swimming pool water, given as a rated volume measured in kWh/m³. Unfortunately these are values that are very difficult to obtain from existing swimming pools.

**What is relevant for implementing the passive house concept?**
**Gollwitzer:** The investment and operating costs have to be jointly taken into consideration. It would be very helpful if clients could also take this approach.

Absolutely fundamental, very important and always underestimated is the collaboration of the various designers
and specialist contractors. For this purpose, I believe that it is worthwhile planning in ideas, time and money in advance so that integral planning is not just talked about but is actually implemented in practice with innovative working methods, thus creating incentives for all those involved.

**About the research project**

The “Bambados” passive house swimming pool cost around 32 million euros and was funded by the German Federal Ministry of Economics and Technology, the Upper Franconian regional government and the Bavarian Ministry of the Environment.

The new sport and leisure pool in Bamberg is an EnOB pilot project. The researchers will very closely monitor whether the building actually functions as envisaged during the day-to-day running of the building. Further information on the building concept can be found at www.enob.info (in German only). The preliminary operational results will also soon be made available here.

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