

STRUKTUR / GLIEDERUNG KURZBERICHT – ENGLISH VERSION

Title

Full version title:

Focusing heating, air conditioning and ventilation technologies on the needs of users in housing on the basis of living concepts

Occasion / starting position

User behavior has a significant impact on the energy consumption in high performance buildings. The research project suggests paying more attention to the user's needs to close the gap between performance and actual energy consumption. It is based on a questionnaire that was used in 615 individual interviews directly in the resident's living room and – in abbreviated form - in 2,653 online interviews.

SPATIAL DISTRIBUTION OF INTERVIEWS



Presence interviews



Online Interviews
Data CC-BY-SA by Openstreetmap

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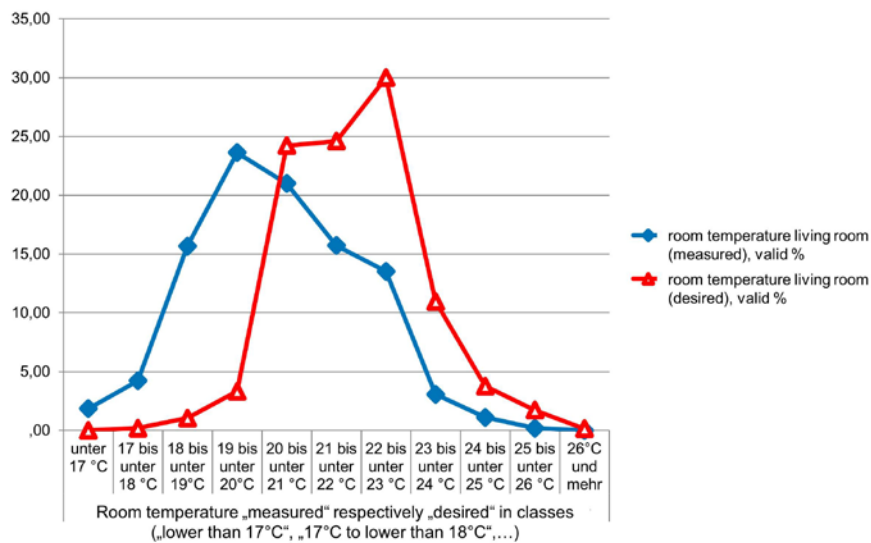
The graph shows the respective postal code areas where the interviews took place.

Subject of the research project

The data was collected in 615 individual interviews of residents in their living room (called "presence interviews"), including discrete observations and measurements, as well as in over 2,653 online questionnaires. The online questionnaire presented here represents a shortening of the presence questionnaire. Presence interviews were mainly conducted in Berlin. The online interviews were carried out in Germany and were evenly distributed across the states. The age distribution was good

in both interview groups. The data obtained were prepared as a database, age-adjusted and evaluated. On the basis of systematic "living concepts", an existing user group classification developed by GdW / InWIS/Analyse&Konzepte, a target group-specific analysis of user behavior should be allowed. This classification was carried out by the interviewer. Respondents to the online survey classified themselves based on image compilations that they should compare with their own living situation. That classification was mainly done in a correct way in both online and presence interviews as it can be confirmed by the answers to certain control questions.

ROOM TEMPERATURE



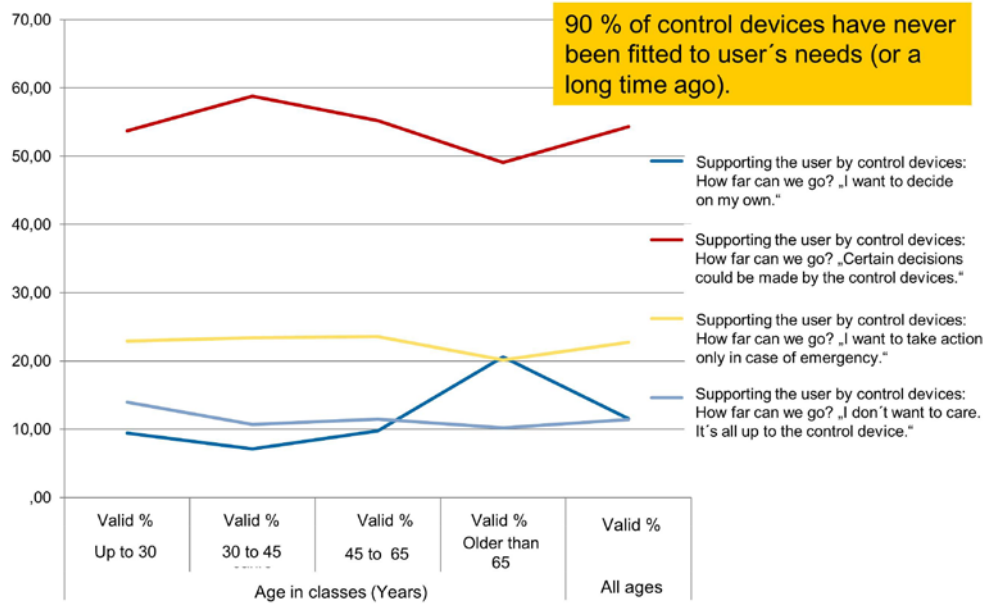
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The actual indoor temperatures differ remarkable from the desire of users.

As it has been shown in the course of the research project, the living concepts for the clustering of the users were not selective enough. However, three user groups were developed ("comfort"-, "economic"- and "ecological" group) on its base, which differ in the energy intensity of their heating needs. Adapted to these three groups a new concept for controls was developed. Different to the regular approach dimensioning bases on a high comfort. This means that the respective design specifications need to be adapted.

The power provided to the user is reduced by a modified control device to the extent actually required. The user can interact mainly by operating elements on the surface of the control device, which are directly accessible to the user. These specify a set of regular technical specifications that cover the corresponding user requirements from a simple to a high level of comfort. This is essentially ambient temperatures and the starting point of time of heating. The control stages are named based on the users group as "comfort", "economic" and "ecological".

PATERNALISM



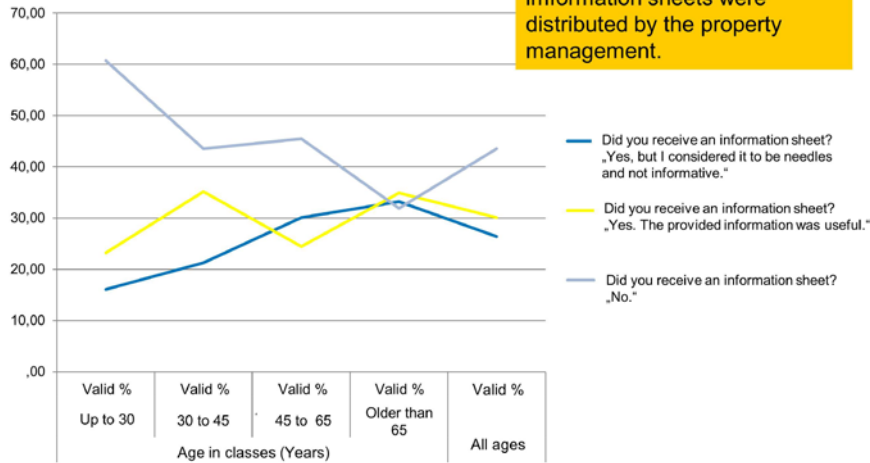
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Although the user wants to have impact on the heating controls, controls were not adjusted to the actual demand.

The consequences of the control concept were checked against a computerised simulation. It was developed as standard equipment a technical minimum consensus, which can be operated intuitively due to its compilation by the user in the planned manner. For any other equipment standards, the consultation is recommended with the user, because the expected user behavior does not automatically fit in each case to the respective technology. Low level training, as can be done for example through the sharing of information sheets, has proven not to be very successful. Drivers for an adapted behavior are cost, convenience and the environment. Thesis is that the user "voluntarily" adapts its behavior if it gets the desired aspects in return. The theme cooling is a corresponding desire that can be satisfied in the context of a specific night ventilation with a mechanical ventilation system. However, this presupposes keeping the windows closed during the day to avoid unnecessarily heating the rooms by the hot external air. This seems to be a behaviour that is immediately plausible to the user.

USER TRAINING

In most cases helpful information sheets were distributed by the property management.

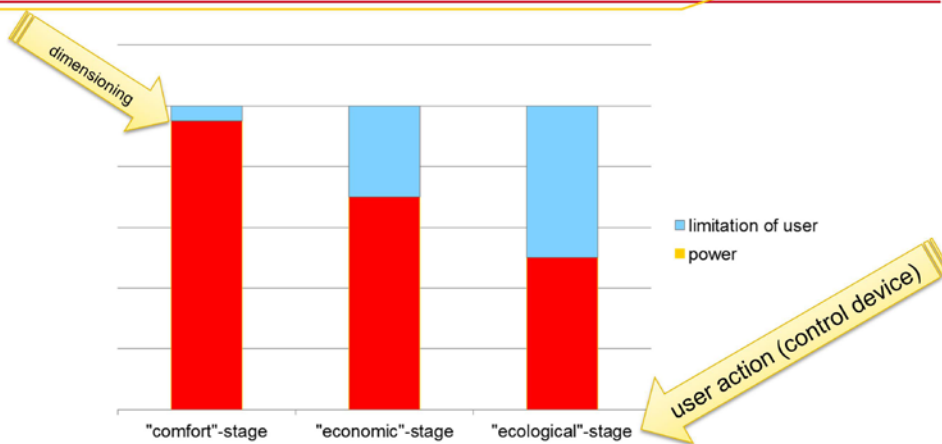


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Although most respondents have been shown to receive written and understandable information about heating correctly, the user does not remind it sufficiently.

As a result of the research project it is recommended to revise design temperatures for the heating load (DIN EN 12831) and the Energy Performance Certificate (DIN V 18599).

NEW CONCEPT FOR DIMENSIONING AND CONTROL DEVICES



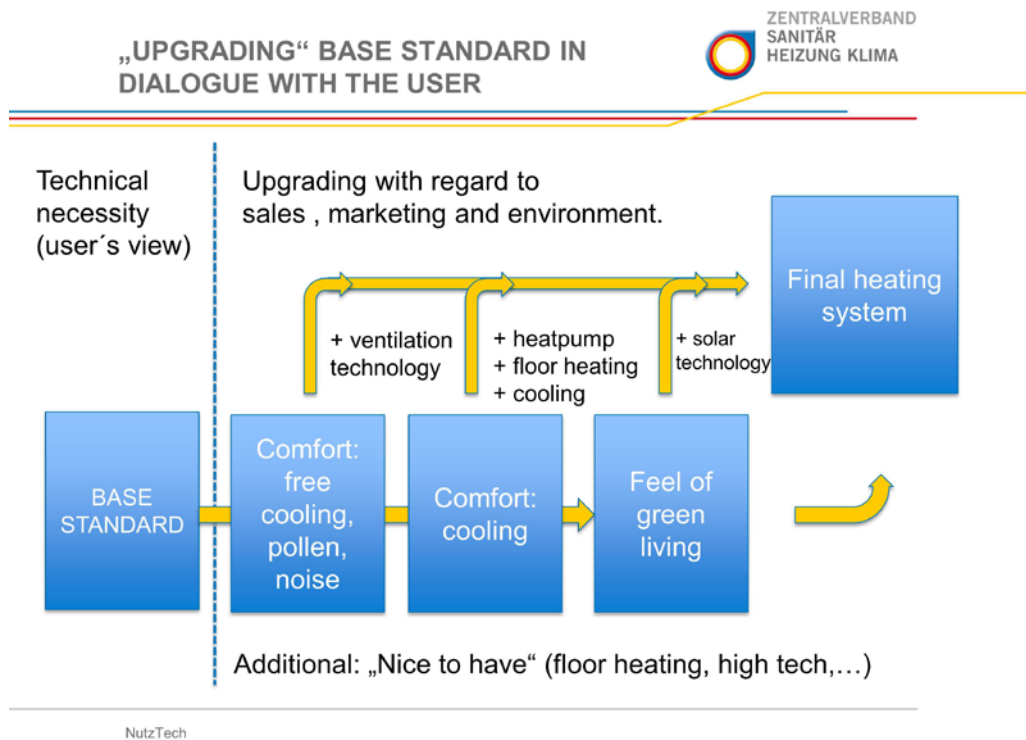
Dimensioning bases on a high comfort. The power provided to the user is reduced by a modified control device to the extend actually required.

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The final report of the research project NutzTech recommends dimensioning the heating system to a high comfort, providing sufficient power to the user's needs. The current, low-power design causes, in practice, the heaters not operating at an optimal operating point.

Conclusion

The research project provides a clustering of users providing a better access to the user's behavior. Instructions on product development in the field of control devices, system design, control concept, design and energy performance rating were developed. The results appear likely to capture quantitatively in the literature often cited rebound- and rebound effects.



The final report of the research project NutzTech recommends a base standard that is relatively robust to the user behavior. In dialogue with the users the standard can be upgraded. Necessary behaviour can be addressed.

The research project is continued after completion in a VdZ working group and committee work of ZVSHK.

Key data

Short title: NutzTech

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Project duration: 33 months