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Breezing through the summer - even without air conditioning

Study reveals savings potential in demand for cooling buildings

Buildings might soon have a considerably lower electricity demand to meet their cooling needs. Savings of 38 percent by 2030 are possible, according to results of a study commissioned by the Federal Environment Agency (UBA). "There are already a number of proven measures in place today that prevent buildings from heating up. In many cases active cooling with an air conditioning system has become unnecessary," said UBA President Jochen Flasbarth. A combination of various measures to reduce demand for cooling can accomplish this, for example by using renewable energies and meeting any residual demand for electricity as efficiently as possible. Every kilowatt hour of electricity saved reduces CO₂ emissions, preserves the climate and is easy on the purse.

Power consumption for cooling of building stock is currently about 21 terawatt hours (TWh). That is roughly four percent of Germany's overall electricity consumption. By 2030 that level could either increase to 29 TWh or sink to 13 TWh if power-saving measures are rigorously implemented. Even in an unlikely hot climate, the electricity demand for cooling in buildings can be reduced slightly.

To achieve this goal, installation of a cooling system should not be a top priority. Firstly, cooling demand must be reduced, namely by opting not to have a high glazing share on the facade, through sunlight protection on building exterior, or intensive ventilation as night cooling, and proper heat storage capacity in walls and ceilings. Solar cooling or geothermal cooling of the air, floors and ceilings can also be applied. Only once these options prove insufficient should efficient air conditioners in combination with surface cooling—perhaps through use of so-called cooling sails which are suspended from sections of ceilings and are water-cooled—be considered. As a rule, tailor-made concepts that outline the bundle of measures necessary for ventilation, heating and cooling are indispensable. User habits and behaviour also influence power consumption. If slightly higher non-conditioned room temperatures are accepted, overall power demand can be reduced significantly.

The analyses sought to reduce not only power consumption but incurred costs as well. Retrofit systems for sun protection are usually cost-efficient in office buildings with large glazing surfaces. Cooling with heat pump earth sensors which provide heating in winter proved efficient in the cases investigated. Solar-powered cooling, by contrast, is costly. It is economically feasible

to install a ventilation system for night-time cooling which improves ambient air quality at the same time and also saves energy needed for heating in winter.

The *Klimaschutz durch Reduzierung des Energiebedarfs für Gebäudekühlung* [Climate Protection by Reducing Cooling Demands in Buildings] study (in German) can be downloaded here
<http://www.uba.de/uba-info-medien-e/3979.html>.

Further reading:

BINE Themeninfo I/2007: *Thermoaktive Bauteilsysteme - Nichtwohnungsbauten energieeffizient heizen und kühlen auf hohem Komfortniveau Thermo-active building systems Energy-efficient heating and cooling of non-residential buildings*
(<http://www.bine.info/hauptnavigation/publikationen/publikation/thermoaktive-bauteilsysteme/>)

Eicke-Henning Werner, Glasarchitektur - Lehren aus einem Großversuch, 2006
(<http://www.energiesparaktion.de/wai1/showcontent.asp?ThemalD=5093>)

Dessau-Roßlau, 20 June 2011