

INDOOR AIR QUALITY, THERMAL COMFORT AND DAYLIGHT

Analysis of residential building regulations in eight EU Member States

Executive briefing

WHY IS INDOOR AIR QUALITY IMPORTANT?

- In urban areas, 60-90% of people's life is spent in buildings*.
- In 2012, 99 000 deaths in Europe and 19 000 in non-European high income countries were attributable to household (indoor) air pollution**.
- Indoor air pollution can be 2-5 times higher than in outside air***.
- Targeting the reduction of their energy demand, buildings are becoming more airtight and IAQ should be carefully considered.
- Economic dimension of increased IAQ: health aspects & productivity.

* Health & Consumer Protection Directorate-General, "Promoting actions for healthy indoor air (IAIAQ)", 2011.

** World Health Organization, "Burden of disease from Household Air Pollution for 2012".

*** Environmental Protection Agency

WHY IS THERMAL COMFORT IMPORTANT?

- Between 30% and 50% of excess winter deaths can be attributable to cold indoor temperatures*.
- Excess heat negatively affects the health of people suffering from cardiovascular, Parkinson's and Alzheimer's diseases, as well as diabetes and epilepsy**.
- Excess cold and mould in homes lead to asthma/respiratory illness and affects negatively the mental health of the occupants***.
- Children's educational attainment and emotional wellbeing can be affected by thermal discomfort****.

* WHO: "Environmental burden of disease associated with inadequate housing"

** Ormandy D., Ezratty V.: "Health and thermal comfort: From WHO guidance to housing strategies"

*** BPIE: "Alleviating fuel poverty in the EU. Investing in home renovation, a sustainable and inclusive solution"

**** WHO: "Health in the green economy. Co-benefits to health of climate change mitigation, Housing Sector"

GUARANTEEING EFFICIENT AND HEALTHY BUILDINGS WITH AN APPROPRIATE LEGISLATION

"Indoor Air Quality is the environmental characteristics inside buildings that may affect human health, comfort or work performance."

(Source: IAQ Scientific Findings Resource Bank)

The report is a legislative overview of existing requirements, de-facto standards and (where suitable) recommendations in selected Member States (MS), regarding indoor air quality and ventilation, thermal comfort and daylight.

The analysis focuses on requirements for new residential buildings, including existing residential buildings where possible and regulated by the selected Member States: Belgium (Brussels Capital Region), Denmark, France, Germany, Italy, Poland, Sweden and the UK (England and Wales).

This report is of primary importance to support the future discussions on national and EU regulation, such as the Energy Efficiency Directive (EED) and the Energy Performance in Buildings Directive (EPBD) reviews.

BPIE identified gaps in the 8 surveyed countries' regulation to ensure that

European citizens live in highly efficient, healthy, comfortable and well lit buildings.

Despite links made with health and productivity aspects, the requirements for indoor air quality and thermal comfort are not comprehensive and clear enough in the 8 surveyed countries.

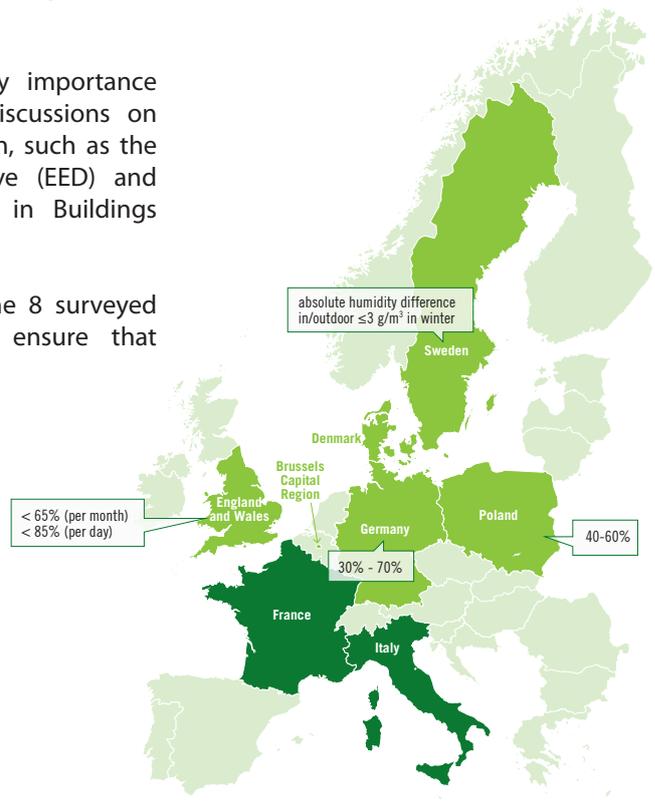
Thermal comfort is defined in EN ISO 7730 as "that condition of mind which expresses satisfaction with the thermal environment".

Even though all acknowledge ventilation's benefits, only in 4 Member States minimum ventilation rates are clearly defined in regulations. Requirements for heat recovery, which can compensate the energy lost from ventilation, are scarce in the national codes for new buildings.

Overview of (de facto) humidity standards in Europe

(Source: BPIE)

- No reference found in legislation
- Requirements/recommendations in place



WHY IS DAYLIGHT IMPORTANT?

- 63% of the people rated natural light as the most important aspect of a home (survey: HOMEWISE, "Without space + light").
- Daylight improves visual and psychological comfort, and has a positive effect on people's performance, attentiveness, satisfaction and capacity to learn.
- Daylight alleviates Seasonal Affective Disorder (a form of depression).
- Exposure to bright light has been shown to be an effective treatment for sleep disorders.
- Daylight through windows is the key source to provide high levels of light, required to sustain the operation of the circadian system.

Source: http://www.lrc.rpi.edu/programs/daylighting/dr_health.asp

For renovations, legally-binding requirements such as minimum ventilation rates, airtightness or limitation of pollutants can hardly be found in the analysed codes.

Few countries check compliance with indoor air quality or thermal comfort standards and if so, mainly at the design stage rather than by performing on-site measurements.

All surveyed countries include at least a basic reference to daylight in their building codes, but only France, Italy and Poland have integrated it into their legislation for new buildings. Only some building codes (Brussels, Denmark, Germany) mention the view to outside as an important part of visual comfort.

"Daylight needs to be considered at the outset of designing a building as daylighting strategies and architectural design strategies are inseparable."

(Source: http://www.ecbcs.org/docs/ECBCS_Annex_29_PSR.pdf)

No requirements have been identified across the surveyed codes stipulating minimum daylight preservation when renovating a building, except in the UK where the regulation "Right to Light" is in place, securing that changes to neighbouring buildings do not reduce daylight availability in existing buildings.

RECOMMENDATIONS ON INDOOR AIR QUALITY, THERMAL COMFORT AND DAYLIGHT



EPBD RECAST

At the EU level, while indoor climate is mentioned in the EPBD, the importance of indoor air quality, thermal comfort and daylight has to be strengthened in a future recast.



EPCs

These aspects could be integrated in the Energy Performance Certification process as relevant information of the actual living conditions in the building.



RENOVATION STRATEGIES

Such requirements should also be reflected in national renovation strategies as developed under Articles 4 and 5 of the Energy Efficiency Directive.



CO-BENEFITS

The co-benefits of thermal comfort and a healthy indoor environment should be taken into account when assessing the macroeconomic impact of energy renovation measures (e.g. reduction of health service costs).



POTENTIAL FOR ENERGY SAVINGS

Unused potentials for energy savings should be further exploited in EU and national legislation taking a system-approach to the building: the building's envelope, its insulation, use of daylight, demand-controlled ventilation, heat recovery, installations to avoid overheating should be optimised to achieve the highest energy saving possible.



COMPLIANCE TOOLS

The mandatory compliance tools to evaluate energy performance according to the national EPBD transposition should, to a larger extent, reward and facilitate the use of energy efficient ventilation solutions and measures to prevent overheating.



STRICTER REQUIREMENTS

Requirements for stricter insulation and airtightness should be completed in EU and national legislation by appropriate minimum requirements for indoor air exchange and ventilation. As there are several ways to obtain significant savings in energy consumption in buildings while at the same time improving the indoor climate, clear legislative provisions for conflicting situations will create certainty for planners and architects.

The full report is available at www.bpie.eu/indoor.html

FOR MORE INFORMATION:

info@bpie.eu / www.bpie.eu / @BPIE_eu