# Annex to venticool position paper

## Annex

This annex gives the venticool's input to the EPBD review structured by answers to several questions of the questionnaire of the public consultation document available at: https://ec.europa.eu/energy/sites/ener/files/documents/EPBD%20Public%20Consultation.pdf.

## A. Overall Assessment

### Question 1. How successful has the EPBD been in achieving on its goals?

Although it is difficult to isolate the effect of the EPBD alone, it is clear that energy efficiency concerns are now of critical importance in the market uptake of building designs, systems, products, and installation methods.

Article 4 of the EPBD states that minimum energy performance requirements set "shall take account of general indoor climate conditions, in order to avoid possible negative effects such as inadequate ventilation, as well as local conditions and the designated function and the age of the building". Nevertheless, several studies strongly suggest that indoor environmental issues and good daylight conditions have been neglected in many member states while implementing energy conservation policies.

This includes thermal comfort and indoor air quality, as excessive focus on reducing heating energy use often increases the overheating risks in summer or the risk of poorly ventilated buildings. As shown by several studies performed within IEA Annex 62, this problem concerns both new and existing buildings [2][3][4]. Also, the UK committee on climate change "analysis suggests that if air-conditioning is used instead of passive cooling measures in both existing and new homes, it would cost society an additional £2 billion (existing homes) and £400 million (new homes) respectively over 15 years, given projected future electricity prices" and it would exacerbate urban heat island effect [1]. The review of the EPBD should address these problems by specifying that MS should implement requirements to avoid these unintended negative impacts and the commission could give guidance to MS on how to define these requirements in national building codes or legislation.

[1] ASC. 2014. Managing climate risks to well-being and the economy. Adaptation Sub-Committee Progress report 2014. https://www.theccc.org.uk/wp-content/uploads/2014/07/Final_ASC-2014_web-version-4.pdf. 202 pp.
[2] Brunsgaard, C., Heiselberg, P., Knudstrup, M.-A., Larsen, T.S. Evaluation of the Indoor Environment of Comfort Houses – Qualitative and Quantitative Approaches. Indoor and Built Environment, 2012, Vol. 21, pp 432-451.
[3] Larsen, T.S., Daniels, O., Jensen, R.L., Andersen, M.R. 2012. EnergiParcel-Projektet: Målinger og analyse af energiforbrug og indeklima i 4 danske parcelhusrenoveringer 2008-2011. Department of Civil Engineering, Aalborg University, Aalborg. DCE Technical Reports, nr. 117
[4] Larsen, T.S., Jensen, R.L., Daniels, O. 2012. The Comfort Houses: Measurements And Analysis Of The Indoor Environment And Energy Consumption In 8 Passive Houses 2008-2011. Department of Civil Engineering, Aalborg University, Aalborg. DCE Technical Reports, nr. 145

### Question 14. Are the objectives of the EPBD delivered efficiently?

In general and in particular in nearly Zero-Energy Buildings, there is a very strong focus on reducing the heating demand. One unintended adverse side effect is that when not having a dual focus on ensuring a good and healthy indoor climate with high comfort and good daylight conditions, the risk of overheating both in summer and shoulder seasons often increases in NZEB buildings due to the increased airtightness, insulation levels and solar gains of these high performance building structures, whether new or renovated. This unintended negative consequence can easily be avoided by a dual focus on energy efficiency and a good indoor climate while maintaining good daylight conditions.

Experience shows that active cooling is often considered to address this problem, while other, more energy efficient options should be prioritised in the building design, when relevant. Proper building design strategies can overcome this risk of overheating with little or even no use of active cooling. These strategies include in particular ventilative cooling (i.e., use of ventilation to cool indoor spaces), adequate solar control (e.g. dynamic shading) and thermal mass utilisation. They give designers a range of options to address the overheating risk and help avoid energy and aesthetics issues associated with the installation of active cooling units in existing buildings.

Although ventilative cooling proves to be effective to address the overheating risk, very few designers implement this strategy in practice because it is in general poorly rewarded in energy performance regulations. This problem, which is of concern to meet the objectives of the EPBD, should be addressed in the review of the EPBD.

## B. Facilitating enforcement and compliance

### Question 23. What do you think of the various ways of calculating building energy performance at national/regional level? Please include examples.

Given local specificities (usage, climate, construction methods, etc.), it seems logical that there are wide differences between the EPB calculation methods developed in the MS. On the other hand, most regulations are missing elements to properly consider summer comfort and ventilative cooling in new and renovated buildings, although these are important if not critical aspects to reach the EPBD objectives.

The vast majority of energy performance calculation methods in Europe do not include summer comfort criteria for free-running non air-conditioned buildings. In these cases, the substantial summer comfort improvements realised with ventilative cooling (as for other passive solutions like solar shading or thermal mass activation) are not rewarded by the calculation. In addition, if mechanical or hybrid ventilation is used, the additional fan energy use may be penalised.

Therefore, EPBD review should address this problem with clear requirements to properly take into account ventilative cooling and summer comfort in calculation methods. This requirement could be introduced in Annex I, paragraph 4 to account for the positive influence of ventilative cooling.

## E. Energy poverty and affordability of housing

### Question 43. Should have further measures tackling energy poverty been included in the EPBD?

Energy poverty has been addressed in Middle and North European countries essentially through heating energy use issues and under-heating problems. With the generalisation of NZEB, this concern will gradually shift towards the summer comfort, with low-income persons more and more vulnerable to over-heating problems they cannot afford to overcome with technologies expensive in terms of energy.

Increased attention to summer comfort in the EPBD and use of low cost solutions like ventilative cooling would help mitigate this negative side effect.

## F. Ensuring new highly efficient buildings using a higher share of renewable energy

### Question 53. What obligations are missing at EU level and national level, and at regional and local level to meet the goals of the EPBD?

The articles of the present EPBD weakly reflect the concern for peak loads mentioned in the "whereas clause", paragraph (25). The most relevant articles focus mostly on the use of renewable energy systems and the energy efficiency of heating and cooling systems, which only implicitly have an impact on peak loads.

venticool partners think that peak load issues should be better reflected in the articles of the EPBD, with explicit requirements to account for peak loads. Such requirements would be beneficial to technologies such as ventilative cooling systems which are, arguably, not considered as renewable energy systems. Note also that dynamic (moveable) shading plays a significant role in reducing the active cooling needs in summer conditions. In addition, shading as part of the window system can be extended or retracted to reduce the energy consumption taking into account free (renewable) energy sources. In particular, dynamic shading can let in free natural daylight through the window to reduce the energy consumption for lighting. In wintertime, shading contributes in reducing the energy consumption for heating: during daytime retracted shading can let in free solar gains and in night time in extended position increase the insulation of the window.

## G. Links between the EPBD and district and city levels, smart cities, and heating and cooling networks

### Question 55. Are there any separate (new) obligations set at city and district level missing from the EPBD which would help increase energy efficiency and use of renewable energy in buildings?

Obligations to consider peak power loads would be beneficial to increasing the use of renewable energy systems. These would also be beneficial to technologies such as ventilative cooling and dynamic shading systems which are, arguably, not considered as renewable energy systems. See also question 53.

### Question 60. What incentives are missing, that would help promote efficient district heating and cooling or meeting the goals of the EPBD?

See questions 53 and 55.

## G. Further comments

The overheating risk should be better addressed, not only given its potential energy implications, but also because of evidence of impacts on health and productivity. Note that:

- The Zero Carbon Hub report [5] on impacts of overheating points out the effects of overheating, in particular, on sleep quality and increased mortality and morbidity and gives an estimate of increased hospital admissions in the UK due to heat waves of 80 000 patient-days per year. It mentions ventilation, shading and thermal mass as key measures to reduce overheating, but also the potential increase of electricity demand due to increase in the use of air conditioning devices.
- The white paper on the impact of indoor environment on health and performance [6] points out socio-economic savings/costs linked to sleep quality and next day performance, productivity loss due to overheating, and learning abilities in schools.


[5] Zero Carbon Hub. 2015. "Impacts of overheating. Evidence review". Available at: http://www.zerocarbonhub.org. 21 pp.

[6] Grün, G., and Urlaub, S. 2014. Towards an identification of European indoor environments' impact on health and performance - homes and schools. White paper. Available at: http://www.ibp.fraunhofer.de/content/dam/ibp/de/documents/Presseinformationen/Velux-Prestudy_WhitePaper_141205_amended.pdf. 6 pp.