REHVA

Federation of European Heating, Ventilation and Air Conditioning Associations

REHVA position paper on the European Commission review of the ENERGY PERFORMANCE OF BUILDINGS DIRECTIVE

General remarks

REHVA supports and acknowledges the main principles of EPBD aiming both at the improvement of energy performance in new buildings with cost optimal minimum energy performance requirements, as well as at the improvement of energy performance in existing buildings with incentives. Following a technology neutral and performance based approach all Member States (MS) have conducted cost optimal calculations with the same (regulated) methodology providing comparable results and many MS have set stringent requirements. This lead to real and cost effective improvement of energy performance in new buildings that is one of the biggest successes of EPBD. Since the cost optimal calculation is required in every 5 years, this mechanism per se is a major driver for development and energy performance improvements. So far there is only limited evidence that nZEB requirements will go beyond cost optimal, hopefully the situation will improve. If applied properly, the incentives result in deep and comprehensive renovation beyond the minimum requirements for major renovation. More ambitious targets of EPBD, such as nZEB, are still in progress in most MS and there is a need for further attention and guidance supporting successful implementation.

Indoor environment quality (IEQ) problems generated by energy efficiency measures

The EPBD includes the statement that indoor climate cannot be compromised when improving energy performance. However, in practice the EPBD was implemented in most MS without paying attention to indoor environmental quality (IEQ) which has led to severe problems, especially in the case of renovations. It is well known that insulation and air tightness improvements stop natural air change and lead to poor IAQ, as well as to significant mould and health problems if controlled ventilation is not arranged when implementing energy efficiency measures. There is also evidence that - if properly applied - heat recovery ventilation does serve as energy efficiency measure, improving IEQ and efficiency at the same time.

To achieve a win-win situation, the EPBD shall handle ventilation as a separate area besides heating and cooling, streamlined through the whole directive as described below:

1. The revised EPBD shall set a clear mandate for Member States to define minimum ventilation and Indoor Environmental Quality (IEQ) requirements that are monitored and reported in a harmonised way in building regulations across Europe. EPBD shall require the MS to:
   - Define minimum ventilation airflow rates which take into account the intended use of the building and the pollutant generation in rooms;
   - Address the issue of the quality of the installed ventilation system and its regular maintenance.

2. REHVA recommends developing a common methodology for an indoor environmental quality indicator to be used together with primary energy indicator. This IEQ indicator shall be reported in a transparent way in the energy performance certificates: it shall provide information about indoor air quality (ventilation rate) and about the indoor thermal environment (summer and winter). This shall be implemented based on the EN 15251 (new number prEN 16798-1) standard defining I-IV indoor climate categories. The indoor climate category shall be added to energy performance certificates. In a more detailed description the indoor climate category could be provided separately for air quality (ventilation rate), temperature in summer and temperature in winter.

3. EPBD shall include the requirement of regular inspection and maintenance of ventilation systems in addition to existing requirement of inspection of air conditioning system.
   The inspection shall include:
   - Assessment of the system efficiency
   - Assessment of the sizing in relation to the indoor air quality requirements of the building. This assessment shall be repeated when the ventilation system, the defined IEQ requirements or the use of the building have been changed.
   - In building with continuous monitoring and control systems in place, Member States may reduce the frequency of such inspections as appropriate.

4. The general framework for the calculation (Annex I of the EPBD) of energy shall consider ventilation and IEQ appropriate by taking into account at least the following aspects:
   - (c) air-conditioning installations;
   - **(c1) ventilation systems including mechanical, hybrid and natural ventilation**
   - (d) **air-tightness of the building envelope and ventilation system**;
   - (h) indoor environmental conditions and indoor environmental quality

5. Minimum ventilation requirements shall be especially addressed in the articles dealing with major renovation because the situation in deep and integrated renovation is more complicated compared to new buildings and the risk that renovation measures will not include controlled ventilation is evident if minimum ventilation requirements are not set as prerequisites of incentives. Therefore, minimum ventilation requirements together with energy performance requirements shall be included in every grant and financial support schemes for energy refurbishment. There are already some existing good practices, for instance KredEx renovation grant scheme in Estonia that contains mandatory installation of mechanical ventilation in apartment buildings.

All issues listed in the previous 5 points are well addressed in the European EPB standards. Therefore, it is important that the EPBD shall refer explicitly to European standards stating that national requirements and methodologies should be in line with European standards. This is the way to strengthen the role of European standards and to foster harmonisation.

Knowledge gap related issues

The different development level of energy calculation methodologies in the MS as well as inexact definition of major energy uses to be accounted in EPBD has led to the situation where MS use extremely different calculation methodologies and have set nZEB requirements varying from 20 to 270 kWh/m^2/y primary energy. REHVA draws attention to the fact that in the case of higher national nZEB values the requirements represent the real energy use of buildings, i.e. calculated and measured energy performance is expected to provide similar results. In the case of very low values they are likely to represent only a small fraction of real, measured energy use. REHVA energy experts are concerned that the credibility of the entire energy performance certificate system is in danger if EPC values report only a small fraction of real energy use, so don't match with reality from the consumers' point of view. REHVA recommends to evaluate the recent situation with EPCs and nZEB requirements (which should represent EPC class A and take the necessary corrective actions in the review process in order to restore the credibility of the EPC system. To improve this situation, the following is recommended:

1. REHVA has concluded that remarkable differences of nZEB values are caused mostly by the different energy uses included, however the calculation methodologies (input data) have also a large effect on the outcomes. In order to achieve measurable and transparent targets, REHVA suggest that the EPBD energy performance definition shall define major energy uses explicitly to be accounted. The definition shall not include "inter alia" formulation. REHVA energy experts recommend that all major energy uses according to the energy demand associated with a typical use of the building is accounted - including appliances, plug loads and lighting (but no processes as stated in REHVA Report No 4, 2013, as well as in the US DOE common definition for zero energy buildings, indicating international scientific consensus in this issue). This is a key issue to ensure that calculated energy use will match measured energy use.

2. To help the development of national calculation methodologies the EPBD and its Annexes should define common grounds making sure that all MS require and measure similar and comparable values. In order to boost harmonisation REHVA recommends including an EC mandate in the EPBD to issue a delegated regulation on energy accounting similarly as was done to prepare the regulation on the cost optimal calculation.

3. Linked to nZEB requirements REHVA wants to stress a small but highly significant problem with building categories. EPBD Annex I provides relevant list of major building categories but many MS have set nZEB requirements for residential and non-residential building categories only. From engineering point of view, these countries can't tackle the eight building categories specified in EPBD Annex I. Building category specific nZEB requirements are important, because usages, intensities and operation times vary a lot between different building types and optimal EE and RES measures differ accordingly. Therefore, in order to achieve that EP requirements, steer to cost effective design solutions, appropriate nZEB requirements and standard use input data has to be defined for each building category.

4. Metering systems are essential both for new buildings and major renovations as already addressed in EPBD Article 8. However, in the review, it would be important to coordinate metering issues in between EED and EPBD so that transparent principles could be set in EPBD for buildings. The iSERVcmb project has shown that it is both feasible and very cost-effective in terms of measured energy savings achieved, to collect operational data at the level of individual sub-meters from new and existing buildings. The best impact was achieved when meters served very clear end uses, such as lighting, small power, chillers/cooling system, ventilation system, space heating and domestic hot water systems. This allowed to locate the problems and to determine actions to reduce the non-intended energy use in straightforward manner. There is also well known solid evidence on individual domestic hot water metering savings. The requirement of major end use and technical systems based metering would be needed to make the implementation common, by following the available best practice for electrical system design. Therefore, an end use and technical systems based metering could be seen more important than dwelling, room or heat emitter based space heating measurement, and could be highly encouraged to be set as the requirement with the aim to achieve operationally nZEB buildings by 2020.

Prof. Stefano Corgnati
REHVA President

Prof. Jarek Kurnitski
REHVA Vice-President
Chair - REHVA Technical and Research Committee

REHVA, the Federation of European HVAC Associations, founded 1963, joins European associations in the area of building engineering services representing more than 100.000 HVAC engineers and building professionals in Europe. REHVA is the leading independent professional HVAC organization in Europe, dedicated to the improvement of health, comfort and energy efficiency in all buildings and communities. It encourages the development and application of both energy efficiency and renewable energy technologies.