

## EVIA Position on the recast Energy Performance of Buildings Directive

EVIA, the European Ventilation Industry Association, welcomes the European Commission's proposal for a recast Energy Performance of Buildings Directive (EPBD). To fully exploit the benefits mechanical ventilation can deliver for the energy efficiency of buildings and the health, comfort and productivity of occupants, we ask the Commission to consider the recommendations outlined in this paper.

### 1. No renovation without ventilation

The primary objective of the Renovation Wave is to improve the energy efficiency of buildings, with a view to decarbonise the existing stock. Energy efficiency renovations primarily target the insulation of the building envelope with a view to limiting thermal losses and thus improving the energy performance of the building. In new or refurbished buildings, which are well insulated, approximately 50% of the energy demand, and even a higher rate in non-residential buildings, can stem from thermal losses due to air renewal through both window airing and non-state of the art or non-properly operating ventilation system losses, depending on the use of the building<sup>1</sup>. **This energy waste can be dramatically reduced thanks to the implementation of a modern and well-functioning dedicated mechanical ventilation system.** Thus, the use of state-of-the-art mechanical ventilation brings the benefit of a reduced building heating and cooling demand. Typically, 1 kWh of consumed electricity results in a saving of 4 to 10 kWh of thermal energy depending on climate and use<sup>2</sup>. To come to a carbon neutral economy by 2050, fossil fuels in heating and cooling should be phased out as early as possible. **The recovery of heat and cold from indoor air in buildings should therefore be promoted as it can significantly reduce the energy consumption necessary for heating and cooling buildings in the first place, and consequently significantly facilitate and accelerate the decarbonization of the sector.**

To further illustrate the benefit of mechanical ventilation heat recovery, such a system, with a 90% heat exchanger efficiency, would allow, assuming an indoor air of 20°C and an outside incoming air of 0°C, to preheat the latter to 18°C without consuming additional electricity. The heating device of the building would then only need to raise the incoming air temperature by 2°C instead of 20°C. This demonstrates the very significant energy consumption optimization potential of mechanical ventilation.

**The recovery of heat and cold from indoor air in buildings is therefore undoubtedly one of the most efficient means to reduce the carbon footprint of the building sector.** Statistically, less than 5%<sup>3</sup> of buildings in the EU are equipped with ventilation energy recovery systems. Thus, recognising and promoting the potential of this simple measure would tap into an enormous potential and contribute significantly to reaching the EU's climate goals. By recovering for re-use what would otherwise be wasted, energy recovery in ventilation systems can result in avoiding large energy losses in buildings, therefore contributing to its overall energy performance and allowing

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<sup>1</sup> [Hamburgisches Weltwirtschaftsinstitut & Shell Deutschland: Shell Hauswärmestudie](#)

<sup>2</sup> Claus Händel, [CLIMA 2019](#), Heat recovery in ventilation systems - waste heat use or renewable energy, Congress - Proceedings of a meeting held 26-29 May 2019, Bucharest, Romania E3S Web of Conferences Volume 111 (2019)

<sup>3</sup> [Review study on the Ecodesign and Energy Regulations on ventilation units ENTR Lot 6 \(2020\)](#): Phase 1.1 and phase 1.2, Final Report, Task 2 Markets, fig. 2 Residential and fig. 3 Non-residential

households to save up to 30% of their heating costs. As a result, implementing this measure can also help to moderate the impact of high energy prices and alleviate the effects of energy poverty.

In addition, demand-controlled ventilation (DCV) also limits thermal losses to the minimum while guaranteeing an adequate air renewal, by smartly adjusting its operation to the effective requirements with the aim of ensuring both indoor air quality and energy efficiency. In short, a DCV system adapts the airflow rate to meet air renewal needs so that pollutant concentrations remain sufficiently low. In this way, air exchanges are limited to what is strictly necessary to ensure a proper indoor air quality, avoiding the generation of unnecessary heating and cooling needs. Moreover, the electricity required for the fan operation is also optimised. Such processes allow to significantly lower the energy consumption of buildings. **The buildings in which the latest demand-controlled or heat/cold recovery ventilation systems are implemented are thus much more energy efficient.**

- **EVIA therefore calls for the EPBD revision to ensure that modern mechanical ventilation systems are included in all new buildings and buildings undergoing renovation.**

Including mechanical ventilation in all new buildings and renovations allows to achieve two aims: energy consumption optimisation and contribution to a good indoor air quality (IAQ).

## 2. Indoor Environment Quality (IEQ)

- The EPBD must promote the reduction of energy needs of the existing building stock through holistic renovations that capture the full improvement potential. Implementing energy efficiency measures **must not lead to negative trade-offs in terms of Indoor Environmental Quality (IEQ).**
- Therefore, **IEQ must be considered alongside energy performance in the EPBD.** To this end, **the scope of the current directive must be extended to require Member States to implement a mandatory framework for minimum IEQ performance standards** and ensure effective implementation.

People spend 90% of their time indoors, with the WHO estimating that 120,000 Europeans die prematurely every year due to poor IAQ, translating into an annual cost to society of EUR 260 billion<sup>4</sup>. Poor IAQ is linked to negative health outcomes from irritation of the eyes, nose, and throat, through headaches, dizziness, and fatigue to respiratory diseases, heart disease, and cancer. **In the context of the current COVID-19 outbreak, benefiting from a well-functioning mechanical ventilation system is a particularly important contributor to maintaining an adequate level of IAQ and to limiting the potential for aerosolised transmission via mechanical air renewal<sup>5</sup>.**

With 97% of EU buildings in need of renovation, the upcoming revision of the Energy Performance of Buildings Directive (EPBD) represents an opportunity to boost both energy efficiency and indoor environmental quality that cannot be missed: by delivering on good indoor air quality and thermal comfort we stand to gain significant benefits in terms of health and well-being of building occupants, as well as productivity gains<sup>6</sup>.

The insulation and in consequence air tightness of the building envelope, heavily reduces the air infiltration and energy losses of a building. In such a context, **controlled air renewal via mechanical ventilation becomes a**

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<sup>4</sup> WHO Regional Office for Europe, OECD (2015). Economic cost of the health impact of air pollution in Europe: Clean air, health and wealth. Copenhagen: WHO Regional Office for Europe

<sup>5</sup> Refer to [IEQ Gathering's Covid 19 statement](#)

<sup>6</sup> BPIE (2018): [Building 4 People – Quantifying the benefits of energy renovation investments in schools, offices and hospitals](#)

**necessity to avoid negatively impacting health outcomes.** As non-residential buildings typically need higher ventilation rates caused by higher occupation density, this aspect is even more acute. The Commission has rightly acknowledged the interrelation between indoor air quality and energy efficiency in the recently published Recommendation and guidelines on the implementation of the energy efficiency first principle<sup>7</sup>. As stated in the guidelines, indoor air quality, linked to the concentration of major indoor air pollutants (carbon dioxide, relative humidity, VOC pollutants such as formaldehyde and benzene, radon, carbon monoxide, ultrafine particulates) strongly depends on the level of air renewal. Improvement of buildings' energy efficiency through better insulation can have a very detrimental impact on indoor air quality if the air within the building is not sufficiently renewed.

**Therefore, ensuring the proper implementation of well-functioning mechanical ventilation systems in new and renovated buildings, is essential to help guarantee an adequate IEQ/IAQ for people living, working, or undertaking recreational activities more than ever in highly insulated and air-tight environments. It is also key to keep the building in good condition.**

As it stands, requirements on IEQ and IAQ are only insufficiently catered for in Member States. The Building Performance Institute (BPIE) found that several Member States have defined partial indicators and limit values on IEQ, but that they are often expressed in different units, not legally binding and below comfort levels, even though European standards are in place<sup>8</sup>. The Commission's Joint Research Centre (JRC) confirms that if buildings renovations are implemented incorrectly without ensuring an adequate air renewal through mechanical ventilation, then good health-based conditions will very likely not be fulfilled, with negative effects on IAQ and consequently on the occupants' health, comfort and performance, The JRC concludes that the importance of indoor air quality, thermal comfort, daylight and noise has to be strengthened in the EPBD and that **inclusion of requirements for indoor air quality in the national regulations of all European countries should be reinforced**<sup>9</sup>.

At the political level, this has been acknowledged by the European Parliament. Several recent own-initiative reports call on the European Commission to regulate indoor air quality and introduce minimum requirements for healthy buildings, including IAQ:

- Report on the implementation of the Energy Performance of Buildings Directive<sup>10</sup>: **"believes that indoor air quality should be included when Member States promote building renovation through public incentive schemes; encourages Member States to improve data collection on indoor environmental quality parameters, with a view to developing minimum indoor environment quality standards; believes that EPCs should therefore become easier to access and read, display practical information on real energy performance, (...) as well as regarding Indoor Environmental Quality parameters.**
- Report on maximising the energy efficiency potential of the current building stock<sup>11</sup>: **"highlights that building renovation projects should always lead to healthy, mould-free buildings, taking into account indoor environmental quality (IEQ); emphasises that the revision of standards for air quality, thermal conditions and other indoor-related health and comfort aspects, including sufficient daylight and mechanical ventilation, contributes to the health and productivity of building users and enhances their work or learning performance".**

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<sup>7</sup> [Commission Recommendation on Energy Efficiency First: from principles to practice](#)

<sup>8</sup> BPIE (2019): [How to integrate indoor environmental quality within national long-term renovation strategies](#)

<sup>9</sup> Joint Research Centre (2017): [Promoting healthy and highly energy performing buildings in the European Union](#)

<sup>10</sup> [European Parliament Report on the implementation of the Energy Performance of Buildings Directive \(2021\)](#)

<sup>11</sup> [European Parliament Report on maximising the energy efficiency potential of the EU building stock \(2020\)](#)

- Report on decent and affordable housing for all<sup>12</sup>: "**calls for the introduction at EU level of minimum mandatory requirements for healthy homes, including indoor air quality, which should at least be aligned with WHO guidelines**".
- Report on the implementation of the Ambient Air Quality Directives<sup>13</sup>: "asks the Commission to look into the consequences of indoor air pollution and possible legislative remedies for all relevant sources of indoor air pollution" and "**calls for the Commission to consider regulating indoor air quality independently or as a part of sustainable buildings legislation**".

EVIA understands that the main objective of the current revision of the EPBD is to deliver on the decarbonization and energy efficiency goals of the Green Deal. Nevertheless, considering the above, the push for an increased rate and depth of energy efficient renovation across the EU, must be accompanied with sufficient attention to the IEQ implications of energy efficiency improvements. We therefore call for the consideration of IEQ in the EPBD revision along the following lines:

- **Include a robust definition for Indoor Environmental Quality:** The term "Healthy Indoor Climate" is mentioned several times in the 2021 recast EPBD. However, commonly indoor climate is understood to refer mainly to temperature and humidity. The quality of the indoor environment depends on many more parameters than just these two. Indoor air quality, acoustics and lighting must also be regulated. Therefore, EVIA proposes to introduce a definition of indoor environmental quality, which is a more widely accepted term encompassing a greater number of essential parameters, and to replace references to indoor climate across the text.
- **Ensure an adequate and controlled air renewal in all new buildings and major renovations, including Zero-Emission Buildings (ZEB):** EVIA believes that the introduction of the Zero Emission Building (ZEB) concept and of minimum energy performance standards (MEPS) at the EU level are vital steps to decarbonising buildings. With 97% of EU buildings in need of renovation, the introduction of the ZEB concept and MEPS represents an opportunity to boost both energy efficiency and indoor environmental quality that cannot be missed. As explained above, the required insulation and in consequence air tightness of the building envelope in highly efficient buildings heavily reduces the air infiltration and air leakages of a building, making controlled air renewal via mechanical ventilation a necessity to avoid negatively impacting the health of occupants and the condition of the building. EVIA therefore calls for consideration of this element in the ZEB concept, the deep renovation definition, as well as provisions on new buildings, major renovations and minimum energy performance standards (MEPS).
- **Ensure that minimum requirements for indoor environmental quality are set by Member States:** Member States should specify parameters and requirements for IEQ based on national or regional needs and develop and implement calculation methodologies to assess the IEQ performance of buildings, taking into account the varied starting points of the Member States in this regard. IEQ performance should at least include values for 1) Indoor air renewal, and 2) The concentration of the most relevant indoor air pollutants.
- **Include information on indoor environmental quality in the Energy Performance Certificate (EPC):** Currently most EPCs do not cover IEQ. In order not to compromise the health and wellbeing of building occupants, recommendations for cost-effective or cost-optimal upgrading of energy performance should also incorporate IEQ aspects. Considering that thermal comfort, indoor air quality, adequate levels of

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<sup>12</sup> [European Parliament Report on access to decent and affordable housing for all \(2020\)](#)

<sup>13</sup> [European Parliament Report on the implementation of the Ambient Air Quality Directives \(2021\)](#)

natural lighting and acoustics are among the most important drivers and benefits of renovation, this would further boost the renovation rate across the EU.

- **Ensure sufficient financial support for technologies contributing to IEQ:** As stated above, in addition to ensuring a good indoor air quality, including mechanical ventilation in all new buildings and renovations allows to achieve the additional aim of energy consumption optimisation through limiting thermal losses or recovering energy. EVIA therefore asks that the EPBD ensures that financial support is made available for the implementation of this technical building system.
- **Revise the smart readiness indicator (SRI) to ensure the deployment of smart technologies for healthy buildings.** The SRI should consider health aspects on an equal footing with other factors such as, for instance, energy savings and energy demand flexibility to fully reflect the importance of indoor environmental quality.

### 3. Technical building systems (Article 11)

**EVIA approves the introduction of requirements under Article 11 for all ZEB buildings and major renovations, where technically and economically feasible, to be equipped with measuring devices for the monitoring of indoor air quality (IAQ).** However, controlled air renewal via mechanical ventilation systems necessarily contributes to a large extent to the level of IAQ, since IAQ, linked to the concentration of major indoor air pollutants (carbon dioxide, relative humidity, VOC pollutants such as formaldehyde and benzene, radon, carbon monoxide, ultrafine particulates) strongly depends on the level of air renewal. A sufficient but controlled level of air renewal is especially crucial in highly insulated and airtight modern buildings. In addition, **modern ventilation systems are increasingly equipped with smart capabilities to monitor IAQ levels and adapt the air renewal flow accordingly to guarantee an adequate IAQ level under normal use conditions of the building.** The unclear wording proposed by the Commission, and the absence of regulation or usual practice on what constitutes sufficient monitoring and regulation of IAQ, risks that Article 11(3) leads to the installation of inadequate solutions, resulting in flawed monitoring of pollution, insufficient air exchange and as a result detrimental health impacts. **As no other technology is able to fulfill both the monitoring and the control requirement, Article 11(3) should ensure the implementation of well-functioning mechanical ventilation systems in new and renovated buildings.**

The WHO estimates that, on average, people spend 90% of their time indoors in residential and non-residential buildings. Poor indoor air quality (IAQ) is estimated to cause the premature deaths of 120,000 Europeans every year entailing an annual cost of EUR 260 billion. The body of evidence on the aerosolised transmission of COVID-19 in indoor environments further underlines the importance of addressing the EU's IAQ issue.

**The introduction of a requirement for IAQ monitoring capacity, through mechanical ventilation systems, will improve the data collection on the IAQ performance of the building stock.** This is the first step on the road to better understanding the IAQ issue in the EU and thus to informing policies at the EU level to drive improvements in the IAQ performance of the building stock to bring it in line with what is desired.

Nevertheless, the provisions in Article 11(3) require further clarification regarding their implementation. Notably, there exists no common definition of indoor air quality, its parameters and the way to measure them at EU level. It is therefore unclear what is meant by "monitoring of indoor air quality" as this could potentially apply to many different pollutants if framed as vaguely. Provisions also need to be specified regarding the quality of the IAQ data collected. For these reasons, **EVIA urges that the Commission be empowered to adopt secondary legislation (implementing or delegated act) to define a number of harmonised aspects** which could, among other texts, rely on relevant standards. **This act should provide a framework for at least the following issues linked to Article 11(3):**

- 1) **What parameters apply for the measurement of IAQ (indoor pollutants, levels of concentrations etc.)**
- 2) **Requirements for monitoring and control accuracy**

Further, Article 11(3) does not specify what should be done with the collected data. EVIA strongly encourages that Member States be required to report a selection of the collected data on the parameters, specified in the implementing regulation, in their national databases which would subsequently be published in the EU Building Stock Observatory (EU BSO). The Commission should be empowered to adopt guidelines to support Member States in identifying the specific relevant parameters to be reported under this requirement.

The data collected will provide much needed information about the actual state of indoor air quality across the EU building stock and should be used as a basis by Member States to define indoor air quality requirements for new buildings. **EVIA proposes that those Members States which have not yet defined IAQ requirements in their regulations are to be required do so by a set deadline, which should not be later than the 1 January 2026.** The Commission should also provide guidelines to the member states as to how IAQ requirements could be formalized, to support this regulatory development.

#### 4. Inspections (Article 20)

**EVIA welcomes the inclusion of mechanical ventilation systems among the regular inspection requirements of the EPBD.** Regular inspection of mechanical ventilation units is key to ensure a proper functioning and thereby contribute to guaranteeing an appropriate indoor air quality level and reduce the building's heat losses and fan energy use. However, the proposed metric summing up the capacities of the three technical building systems (TBS) to the threshold of 70kW of effective rated output is not suitable for ventilation systems. **A more suitable metric would be based on airflow rates (in m<sup>3</sup>/h), which is common to describe the capacity of ventilation systems and is already being widely used in national regulations on the subject.** EVIA considers a threshold of 500m<sup>3</sup>/h to be suitable as this would exclude small residential systems, while still ensuring a satisfactory coverage<sup>14</sup>.

In addition, EVIA would like to point out that the assessment of fans alone cannot guarantee that a ventilation system works correctly. Deficiencies in heat recovery units, ducting, vents, air intakes etc. can be the cause of insufficient airflows and/or overconsumption of fans. **The inspection requirement should therefore be extended to cover all elements of a mechanical ventilation system.**

EVIA notes that Article 20 does not lay down rules for enforcement, e.g. corrective actions in the case that non-compliances are detected during an inspection. **EVIA suggests that Article 20 should include a basic requirement to take corrective action in case of non-compliances.**

#### 5. Smartness and digitalisation (Articles 20 & 14)

Smartness will become mandatory for the vast majority of new buildings from 2030, a measure that will accelerate the digitalisation of the building stock and harness its capacity to deliver energy savings from more

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<sup>14</sup> Commission Regulations (EU) No. 1253/2014 and (EU) No. 1254/2014 define residential ventilation units as having a maximum flow rate that does not exceed 250 m<sup>3</sup> /h, or between 250 and 1 000 m<sup>3</sup> /h if the manufacturer declares its intended use as being exclusively for a residential ventilation application.

efficiency/responsive use of TBS during their operational lifetimes while ensuring an adequate indoor environmental quality.

For all new residential buildings and those undergoing major renovations, certain monitoring and control functionalities of technical building systems will be mandatory from 2025. Installation of BACS in large non-residential buildings (> 290 kW) is already mandatory but the implementation of this requirement is to be expedited to 2025, whilst the scope will be lowered to 70 kW from 2030. EVIA notes that all residential buildings, most of which will be under 70 kW, will be covered by technical building systems monitoring and control requirements, while small non-residential buildings under 70 kW will be exempt.

An approach by which the regulation of monitoring and control systems incorporated in TBS is to be dealt with within each dedicated TBS lot needs to be confirmed in the context of the ENER LOT 38 preparatory study on BACS. Elements related to interoperability must also be clarified, please see ENER LOT 33 Smart Appliances.

In this context, EVIA welcomes with caution the empowerment of the Commission, under the new Article 14 on data exchange, to “adopt implementing acts detailing interoperability requirements, and non-discriminatory and transparent procedures for access to data”.

A framework for data exchange and interoperability is essential as digitalisation rapidly proliferates in the context of buildings. However, EVIA believes that the empowerment of the Commission under Article 14 has to be coherent with the multiple initiatives ongoing within the Commission to support the digitalisation of buildings.

In particular, EVIA would like to highlight the work being undertaken at the product/Technical Building System (TBS) level under the framework of Ecodesign (ErP):

- Interoperability is a central issue for the preparatory study on measures for Building Automation & Control Systems (BACS) (ENER LOT 38), at both the building management level and for controls incorporated in TBS.
- In addition, interoperability is a key feature of the work on Smart Appliances (ENER LOT 33)

More widely, the Commission is known to be working on a ‘Digitalisation of the Energy Sector Action Plan’, which is understood to include a potential ‘area’ on ‘Developing a European data-sharing infrastructure’ that references the “development of an interoperability framework”.

Against this unclear backdrop it is essential that the Commission avoids the risk of double regulation. It would be prudent for the Commission to nurture and see to fruition developments under ENER LOT 38 and ENER LOT 33, before working on the Article 14 interoperability implementing act.

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### About EVIA

The European Ventilation Industry Association (EVIA)’s mission is to represent the views and interests of the ventilation industry and serve as a platform between all the relevant European stakeholders involved in the ventilation sector, such as decision-makers at the EU level as well as our partners in EU Member States. Our membership is composed of more than 40 member companies and 6 national associations across Europe, realising an annual turnover of over 7 billion euros and employing more than 45,000 people in Europe.

EVI aims to promote highly energy efficient ventilation applications across Europe, with high consideration for health and comfort aspects. Good indoor air quality is a critical element of the health of people and contributes to keeping buildings in good condition.