June 2024

Advisory Note

Transposition and implementation of the Energy Performance of Buildings Directive (EPBD)

EVIA
European Ventilation Industry Association

The revised Energy Performance of Buildings Directive (EPBD) is a great opportunity to set high standards for tomorrow's buildings, drive the much-needed changes and improvements in the existing stock and promote systems and solutions that result in high Indoor Air Quality (IAQ) and low energy consumption.

EVIA, representing the European ventilation industry in Europe, calls on EU Member States to support an ambitious and correctly implemented EPBD that will be essential to meet the EU's climate and energy targets and improve citizens' health, comfort and productivity.

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1. Definitions

41. **'digital building logbook'** means a common repository for all relevant building data, including data related to energy performance such as energy performance certificates, renovation passports and smart readiness indicators, as well as data related to the life-cycle GWP, which facilitates informed decision making and information sharing within the construction sector, and among building owners and occupants, financial institutions and public bodies;

EVIA Recommendations: the digital building logbook should also include data relative to the quality of the indoor environment based in particular on elements relative to indoor air quality such as the ventilation rate of ventilation systems, the measured level of humidity and concentrations of indoor pollutants, all three parameters affecting the health and well-being of building occupants, as per the definition of IEQ.

44. **'ventilation system'** means the technical building system which provides outdoor air to a space by natural or mechanical means;

EVIA Recommendations: Mechanical ventilation systems cover unidirectional and bidirectional ventilation systems. Air renewal through window airing, as it is not dimensioned, should not be confused with a ventilation system. Natural ventilation systems consist in stack ventilation.

66. **'indoor environmental quality'** means the result of an assessment of the conditions inside a building that influence the health and wellbeing of its occupants, based upon parameters such as those relating to the temperature, humidity, ventilation rate and presence of contaminants.

EVIA Recommendations: the parameters mentioned in the "indoor environmental quality" definition greatly impact the health and well-being of building occupants. It is the case of humidity which can also affect the building integrity. The relative humidity of the indoor environment should be kept within an appropriate range. Indeed, if the air is too dry, it will favour infections and respiratory diseases.

When too humid, it leads to the development of mould which, among other affections, is responsible for asthma. Mould also damages the building itself requiring renovation works which could be avoided.

The ventilation rate of mechanical ventilation systems is instrumental in ensuring an adequate indoor air quality in buildings. A mechanical ventilation system guarantees a sufficient but controlled air renewal. This is all the more important in well-insulated and thus air-tight buildings be they new or renovated. By ensuring a sufficient air renewal, mechanical ventilation systems strongly contribute to keeping the humidity level within the appropriate range and indoor pollutants at levels which are not detrimental to occupants' health. As such, it is important that Member States set ventilation rates at levels which allow to fully play their above-mentioned role. The other major advantage of mechanical ventilation systems is that they control the air renewal so that the energy losses it incurs is limited to what is absolutely necessary to maintain a healthy indoor environment. Thus, it allows to optimise the heating and cooling needs of buildings.
However, results from the HealthVent project supported by the European Commission DG Sanco[1] have revealed that ventilation rates given in the Member States' regulations are very heterogeneous and inconsistent. Depending on the type of building and the country, exhaust rates can vary from a factor 1 to 6. In addition, several values were found to be looser than the recommended values published in European standards and WHO guidelines, thus allowing lower ventilation rates. Moreover, some countries have still no legal requirements regarding ventilation rates and use voluntary based ventilation rates. As such, the report clearly recommends the establishment on the European level of adequate ventilation rates.

An additional parameter which Member States ought to consider is the indoor CO_2 concentration as it is a very good proxy of the extent to which the air inside a building is renewed. This is internationally recognised and included in the European standard EN 16798-1 relative to "*Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics*".

[1] https://op.europa.eu/en/publication-detail/-/publication/58331594-1e4d-11eb-b57e-01aa75ed71a1/language-en

On top of humidity, ventilation rates and CO_2 levels, members states may want to include among indoor environmental quality parameters, the concentration of some contaminants such as particulate matter 2.5 and volatile organic compounds (VOC) whose impact on health is already well documented and recognised.

2. National Building Renovation Plan

Article 3

1. Each Member State shall establish a national building renovation plan to ensure the renovation of the national stock of residential and non-residential buildings, both public and private, into a highly energy-efficient and decarbonised building stock by 2050, with the objective to transform existing buildings into zero-emission buildings.

2. Each national building renovation plan shall include:

(a) an overview of the national building stock for different building types, including their share in the national building stock, construction periods and climatic zones, based, as appropriate, on statistical sampling and the national database for energy performance certificates pursuant to Article 22, an overview of market barriers and market failures and an overview of the capacities in the construction, energy efficiency and renewable energy sectors, and of the share of vulnerable households based, as appropriate, on statistical sampling;

(b) a roadmap with nationally established targets and measurable progress indicators, including the reduction of the number of people affected by energy poverty, with a view to achieving the 2050 climate neutrality goal, in order to ensure a highly energy-efficient and decarbonised national building stock and the transformation of existing buildings into zero-emission buildings by 2050;

(c) an overview of implemented and planned policies and measures, supporting the implementation of the roadmap pursuant to point (b);

(d) an outline of the investment needs for the implementation of the national building renovation plan, the financing sources and measures, and the administrative resources for building renovation;

(e) the thresholds for the operational greenhouse gas emissions and annual primary energy demand of a new or renovated zero-emission building pursuant to Article 11;

(f) minimum energy performance standards for non-residential buildings on the basis of maximum energy performance thresholds pursuant to Article 9(1);

(g) national trajectory for the renovation of the residential building stock, including the 2030 and 2035 milestones for average primary energy use in kWh/(m2.y) pursuant to Article 9(2); and

(h) an evidence-based estimate of expected energy savings and wider benefits, including those related to indoor environmental quality.

The roadmap referred to in point (b) of this paragraph shall include national targets for 2030, 2040 and 2050 as regards the annual energy renovation rate, the primary and final energy consumption of the national building stock and its operational greenhouse gas emission reductions; specific timelines for non-residential buildings to comply with lower maximum energy performance thresholds pursuant to Article 9(1), by 2040 and 2050, in line with the pathway for transforming the national building stock into zero-emission buildings; and an evidence-based estimate of expected energy savings and wider benefits, including those related to indoor environmental quality.

Where an overview of specific policies and measures as referred to in point (c) or an outline of specific investment needs as referred to in point (d) is already included in the national energy and

climate plans, a clear reference to the relevant parts of the national energy and climate plans may be included in the building renovation plan in place of a fully developed overview.

EVIA Recommendations: for the reasons detailed above, and in particular due to the increase of the air-tightness of renovated buildings which are well insulated, it is essential that renovation plans indicate the measures which have been taken to address the issue of an adequate indoor environment and in particular indoor air quality in refurbished buildings. The relevance of the regulatory requirements implemented is to be objectivised through the evidence-based estimate of the benefits awaited from the indoor environmental quality attained in renovated buildings through the provisions in question.

3. Minimum energy performance standards

Article 5§1

Member States shall take the necessary measures to ensure that minimum energy performance requirements for buildings or building units are set with a view to at least achieving cost-optimal levels and, where relevant, more stringent reference values such as nearly zero-energy building requirements and zero-emission buildings requirements. The energy performance shall be calculated in accordance with the methodology referred to in Article 4. Cost-optimal levels shall be calculated in accordance with the comparative methodology framework referred to in Article 6.

Member States shall take the necessary measures to ensure that minimum energy performance requirements are set for building elements that form part of the building envelope and that have a significant impact on the energy performance of the building envelope when they are replaced or retrofitted, with a view to achieving at least cost-optimal levels. Member States may set the requirements for building elements at a level that would facilitate the effective installation of low temperature heating systems in renovated buildings.

When setting requirements, Member States may differentiate between new and existing buildings and between different categories of building.

Those requirements shall take account of optimal indoor environmental quality, 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.

Member States shall review their minimum energy performance requirements at regular intervals which shall not be longer than five years and shall, if necessary, update them in order to reflect technical progress in the building sector, the results of the cost-optimal calculation set out in Article 6, and updated national energy and climate targets and policies.

EVIA Recommendations: when setting minimum energy performance standards, Member States should ensure that the requirement set does not prevent a sufficient but controlled renewal of the indoor air thanks to the proper operation of a mechanical ventilation system. In fact, a part of the energy consumption of the building could be earmarked for the operation of the mechanical ventilation so that it delivers the expected ventilation rate. This proposal could materialise through retaining by default in energy calculation methodologies a reference air renewal rate of 2,5 $m^3/h/m^2$ as foreseen in the upcoming revision of the ecodesign lot 6 regulation on ventilation. If a dedicated air renewal system is implemented, then its actual air renewal rate would be taken into account in the energy calculation. This would allow to take account of optimal indoor environmental quality and avoid possible negative effects such as inadequate ventilation. This is particularly underlined at the beginning of paragraph 2 of annex I of the directive.

Article 7§6

6. Member States shall address, in relation to new buildings, the issues of optimal indoor environmental quality, adaptation to climate change, fire safety, risks related to intense seismic activity and accessibility for persons with disabilities. Member States shall also address carbon removals associated to carbon storage in or on buildings.

EVIA Recommendations: Member States are to implement in their regulations for new buildings requirements relative to minimum ventilation rates, relative humidity as well as CO_2, PM2.5 and VOC concentrations along the details mentioned in the recommendations for the implementation of paragraph 4 of article 13.

Article 8§3

3. Member States shall, in relation to buildings undergoing major renovation, encourage high-efficiency alternative systems, in so far as technically, functionally and economically feasible. Member States shall address, in relation to buildings undergoing major renovation, the issues of indoor environmental quality, adaptation to climate change, fire safety, risks related to intense seismic activity, the removal of hazardous substances including asbestos and accessibility for persons with disabilities.

EVIA Recommendations: Member States are to implement in their regulations for buildings undergoing major renovation requirements relative to minimum ventilation rates, relative humidity as well as CO_2, PM2.5 and VOC concentrations along the details mentioned in the recommendations for the implementation of paragraph 4 of article 13.

4. Renovation Passport

Article 12

1. By 29 May 2026, Member States shall introduce a scheme for renovation passports based on the common framework set out in Annex VIII.

2. The scheme referred to in paragraph 1 shall be of voluntary use by owners of buildings and building units, unless the Member State decides to make it mandatory.
Member States shall take measures to ensure that renovation passports are affordable and shall consider whether to provide financial support to vulnerable households wishing to renovate their buildings.

3. Member States may allow for the renovation passport to be drawn up and issued jointly with the energy performance certificate.

4. The renovation passport shall be issued in a digital format suitable for printing, by a qualified or certified expert, following an on-site visit.

5. When the renovation passport is issued, a discussion with the expert referred to in paragraph 4 shall be suggested to the building owner to allow the expert to explain the best steps by which to transform the building into a zero-emission building well before 2050.

6. Member States shall strive to provide a dedicated digital tool by means of which to prepare and, where appropriate, update the renovation passport. Member States may develop a complementary tool allowing building owners and building managers to simulate a draft simplified renovation passport and for them to update it once a renovation takes place or a building element is replaced.

7. Member States shall ensure that the renovation passport can be uploaded to the national database for the energy performance of buildings set up pursuant to Article 22.

8. Member States shall ensure that the renovation passport is stored in, or can be accessed via, where available, the digital building logbook.

EVIA Recommendations: the renovation passport should include information on actions foreseen for improving the health dimension and the indoor environmental quality of the building to be renovated. To that end, it should foresee the installation of a mechanical ventilation system when there is none and the replacement of an existing one when it is not operating properly or old. Indeed, the latest mechanical ventilation systems, complying with the current ecodesign regulation, are particularly efficient to optimise the energy consumption of buildings and have a very low self-electricity consumption.

5. Technical building systems

Article 13 §4 §5 §6 §10 §11

4. Member States shall set requirements for the implementation of adequate indoor environmental quality standards in buildings in order to maintain a healthy indoor climate.

5. Member States shall require non-residential zero-emission buildings to be equipped with measuring and control devices for the monitoring and regulation of indoor air quality. In existing non-residential buildings, the installation of such devices shall be required, where technically and economically feasible, when a building undergoes a major renovation. Member States may require the installation of such devices in residential buildings.

6. Member States shall ensure that, when a technical building system is installed, the overall energy performance of the altered part and, where relevant, of the complete altered system is assessed. The results shall be documented and passed on to the building owner, so that they remain available and can be used for the verification of compliance with the minimum requirements laid down pursuant to paragraph 1 and the issue of energy performance certificates.
Member States shall take the necessary measures to ensure that the energy performance of technical building systems is optimised where they are retrofitted or replaced.
Member States shall promote energy storage for renewable energy in buildings.
Member States may provide for new incentives and funding to encourage the switch from fossil-fuel-based heating and cooling systems to non-fossil-fuel-based heating and cooling systems.

10. The building automation and control systems shall be capable of:

(a) continuously monitoring, logging, analysing and allowing for adjusting energy use;

(b) benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement;

(c) allowing communication with connected technical building systems and other appliances inside the building, and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers;

(d) by 29 May 2026 monitoring of indoor environmental quality.

11. Member States shall lay down requirements to ensure that, where technically, economically and functionally feasible, from 29 May 2026, new residential buildings and residential buildings undergoing major renovations are equipped with the following:

(a) the functionality of continuous electronic monitoring that measures systems' efficiency and informs building owners or managers in the case of a significant variation and when system servicing is necessary;

(b) effective control functionalities to ensure optimum generation, distribution, storage, use of energy and, where applicable, hydronic balance;

(c) a capacity to react to external signals and adjust the energy consumption.

Member States may exclude single-family houses undergoing major renovations from the requirements laid down in this paragraph where the costs of installation exceed the benefits.

EVIA Recommendations:

Paragraph 4: in addition to the comments made regarding the definition of indoor environmental quality, our recommendation is that Member States set requirements for the following IEQ parameters in the following way:

- **ventilation rates**:
    - In residential buildings:
        - for occupied habitable spaces (living-rooms, bedrooms, etc...): 0,63 l/s/m^2 corresponds to the value of 0,42 l/s/m^2 of the category 2 of the table B.11 of paragraph B. 3.2.2 on “design supply air flow rates” from the annex B of the EPBD standard EN 16798-1 multiplied by a factor of 1,5 to express it in a metric of square meters of floor area of habitable spaces from an initial metric of air flow rate per square meters of heated floor area. This 1.5 multiplier is a typical ratio between the heated floor area, the whole surface of the dwelling, and the habitable spaces area (living room, bedrooms, study...) of the dwelling. The category 2 level was chosen as it is described as a normal level of expectation for indoor environmental quality. It can be considered as a balanced choice.

            Depending on the effective occupation of the room, it should be made possible to adjust the ventilation rate accordingly.
        - for non-occupied habitable spaces (living-rooms, bedrooms, etc...): we recommend 0,13 l/s/m^2 which represents 20% of the rate when the space is occupied. This allows to continue to deal with pollutants emitted inside the habitable space by construction material, furniture, etc... while even further minimising thermal losses. Paragraph B.3.2.5 regarding “design ventilation air flow rate during unoccupied periods” from the annex B of the EPBD standard EN 16798-1 recommends that it be comprised between 0,1 and 0,15 l/s /m^2.
        - for occupied exhaustible spaces (kitchen, bathroom, toilets...):
            - kitchen: 20l/s,
            - bathroom and toilet: 10l/s.

            These values are mentioned in table B.13 of paragraph B.3.2.3 on “design extract air flow rates” of the annex B of the EPBD standard EN 16798-1.

            Depending on the effective occupation of the room, it should be made possible to adjust the ventilation rate accordingly.

- for non-occupied exhaustible spaces (kitchen, bathrooms, toilets...) the reference flow rate during absence should amounts to 20% of the one when the room is occupied:
    - kitchen: 4l/s,
    - bathroom and toilets: 2l/s.

  As for non-occupied habitable spaces, we recommend retaining 20% of the occupied space air renewal value as proposed in paragraph B.3.2.5 regarding "design ventilation air flow rate during unoccupied periods" of the annex B of the EPBD standard EN 16798-1.

  This allows to continue to deal with pollutants emitted inside the habitable space by construction material, furniture, etc... while even further minimising thermal losses.

- In any non-residential buildings:
    - for occupied spaces: 7l/s/person as recommend by the category 2 of table B.6 relative to "the design of ventilation rates for sedentary, adults, non-adapted persons for diluting emissions (bio effluents) from people" of the annex B of the EPBD standard EN 16798-1. The category 2 level was chosen as it is decribed as a normal level of expectation for indoor environmental quality. It can be, in our view, considered as a balanced choice,
    - for non-occupied spaces: when a room of the building is not occupied throughout the day, the ventilation rate can be lowered but not below the minimum of 0,15 l/s/m2 of floor area so as to continue to dilute emissions from the building (construction material, furniture...). This value is mentioned in paragraph B.3.1.5 relative to "ventilation air flow rate during unoccupied periods" of the annex B of the EPBD standard EN 16798-1,
    - when the building is closed: in case the ventilation is shut off, the minimum amount of air to be delivered prior to occupation is by default: 1 volume within 2 hours of the zone to be ventilated. This value is mentioned in paragraph B.3.1.5 relative to "ventilation air flow rate during unoccupied periods" of the annex B of the EPBD standard EN 16798-1.

- **relative humidity range**: to be kept between 30% and 70% to avoid an air too dry and too humid,
- **CO_2 concentration**:
    - for residential buildings: the CO_2 level for this typology of building is to be defined on the basis of indicators from standard prEN 15665:2024 and in particular the one relative to the average concentration of CO_2 in an occupied room. This standard is under its final revision stage,
    - for non-residential buildings: we recommend the level of 800 ppm of the category 2 of table B.9 relative to "default design CO_2 concentrations above outdoor concentration assuming a standard CO_2 emission of 20 l/h/person" of the annex B of the EPBD standard EN 16798-1. With the outdoor concentration being around 450 ppm, this would bring the indoor environment CO_2 limit to 1250 ppm. The category 2 level was chosen as it is described as a normal level of expectation for indoor environmental quality. It can be considered as a balanced choice.
- **PM2.5**: an indoor requirement should be formalised for buildings located in an area where the outside PM2.5 concentration is above the limit of 10 μ g/m³/year, the WHO recommending 5 μ g/m³/year. This information would be delivered by a dynamic cartography. In such situation, it could also be required that ventilation systems be fitted with filtering media,
- **Volatile organic compounds**: it seems difficult to formalise requirements for all the different harmful types of VOCs, which are also complex to measure and to discriminate between them. However, limiting the presence of these pollutants is desirable. The regulations of some Member States, such as France, require that concentrations of formaldehyde and benzene don't exceed a certain limit. However, such a measure is not easy to implement, as it requires samples to be taken and analysed in a laboratory. A more operational alternative would be to represent all VOCs using a single fictitious pollutant whose concentration would be simulated so as to compare it with a maximum value that must not be exceeded. A similar approach could be taken for the kitchen, which is certainly the most polluted room in a dwelling mixing different types of pollutants such as VOCs, particulate matter, humidity and combustion products.

Paragraph 5: mechanical ventilation systems are the most obvious devices to monitor and regulate indoor air quality as they are fitted with sensors which control the air flow necessary to contribute to maintaining an adequate level of indoor air quality. In the case of non-residential systems, the information relative to the air flow and the indoor air quality can then be shared with a building automation and control system for it to aggregate for the occupant all the building's relevant information.

Paragraph 10: EVIA is concerned about the fact that the IAQ monitoring requirement relative to building automation and control systems capabilities could threaten the capacity of other products to include smart functionalities. Indeed, some tenders in Member States require ventilation products to be supplied without a control system, believing that only the building automation and control system can include this added value. The smartness of a building is rather embedded in a decentralised way at the technical building system level which doesn't prevent it to naturally communicate with BACS and convey relevant information for the occupant at a centralised level. The transposition guidelines should thus recommend that the IAQ monitoring requirement regarding BACS can also be fulfilled through the capacity of decentralised products, namely a ventilation system, to assess IAQ and communicate the information to a centralised system...

Paragraph 11: regarding the requirement of residential buildings to be equipped with the functionality of measuring the system's efficiency and informing in the case of variation or when servicing is needed, it is to be noted that many technical building systems, such as ventilation, are capable of carrying out a self-assessment of the way they operate and convey the information about any deficiencies to the person responsible for the building maintenance. The latter is then more predictive and less reactive. Such an approach should be valorised by the Member States.

6. Smart Readiness Indicator

Article 15

1. The Commission shall adopt delegated acts in accordance with Article 32 to supplement this Directive concerning an optional common Union scheme for rating the smart readiness of buildings. The rating shall be based on an assessment of the capabilities of a building or building unit to adapt its operation to the needs of the occupant, in particular concerning indoor environmental quality and the grid and to improve its energy efficiency and overall performance.

In accordance with Annex IV, the optional common Union scheme for rating the smart readiness of buildings shall lay down:

(a) the definition of the smart readiness indicator;

(b) methodology by which it is to be calculated.

2. By 30 June 2026, the Commission shall submit a report to the European Parliament and the Council on the testing and implementation of the smart readiness indicator on the basis of the available results of the national test phases and other relevant projects.

Taking into account the outcome of that report, the Commission shall, by 30 June 2027, adopt a delegated act in accordance with Article 32, supplementing this Directive by requiring the application of the common Union scheme for rating the smart readiness of buildings, in accordance with Annex IV, to non-residential buildings with an effective rated output for heating systems, air-conditioning systems, systems for combined space heating and ventilation, or systems for combined air-conditioning and ventilation of over 290 kW.

EVIA Recommendations: the SRI indicator put together in the frame of the previous EPBD was not sufficiently taking into account the need for building occupants to benefit from a qualitative indoor environment. It was primarily focusing on the capacity of the building to offset its consumption to reduce the power demand on the network. It has to be noted that, although mechanical ventilation systems are more and more smart by extracting the amount of indoor air when and where it is necessary and only to the extent which is needed, with also the capacity to recover heat and cold from extracted air, this technical building system has to function continuously in residential buildings. For instance, this is mandatory by regulation in France. In non-residential buildings, following the COVID sanitary crisis, the operating time goes beyond the strict presence of people at the beginning and the end of a typical day but can be stopped overnight. These particularities regarding the operation of mechanical ventilation systems have to be taken into account when defining the future smart readiness indicator. It is also important to note that mechanical ventilation systems account for less than 1% of the typical annual energy consumption of a building. As such, their impact on reducing power demand on the network is negligible.

7. Financial Incentives and Market Barriers

Article 17 § 7 & §9

7. To support the mobilisation of investments, Member States shall promote the effective development and use of enabling funding and financial tools, such as energy efficiency loans and mortgages for building renovation, energy performance contracting, pay-as-you-save financial schemes, fiscal incentives, for example reduced tax rates on renovation works and materials, on-tax schemes, on-bill schemes, guarantee funds, funds targeting deep renovations, funds targeting renovations with a significant minimum threshold of targeted energy savings and mortgage portfolio standards. They shall guide investments into an energy-efficient public building stock, in line with Eurostat guidance on the recording of energy performance contracts in government accounts.
Member States may also promote and simplify the use of public-private partnerships.

14. With due regard to vulnerable households, Member States shall link their financial measures for energy performance improvements and reduced greenhouse gas emissions in the renovation of buildings to the targeted or achieved energy savings and improvements, as determined by one or more of the following criteria:

(a) the energy performance of the equipment or material used for the renovation and the related greenhouse gas emission reduction; in which case, the equipment or material used for the renovation is to be installed by an installer with the relevant level of certification or qualification and shall comply with at least minimum energy performance requirements for building elements or higher reference values for an improved energy performance of buildings;

(b) standard values for the calculation of energy savings and greenhouse gas emission reduction in buildings;

(c) the improvement achieved due to such renovation by comparing energy performance certificates issued before and after renovation;

(d) the results of an energy audit;

(e) the results of another relevant, transparent and proportionate method that shows the improvement in energy performance, for example by comparing the energy consumption before and after renovation with metering systems, provided it complies with the requirements set out in Annex I.

EVIA Recommendations: as ensuring an adequate indoor environmental quality is now a requirement from the directive, we believe that financial support should be made available by Member States to help building owners/managers comply with the requirements which will have been set on this aspect. This recommendation should particularly apply to the upgrade of the existing stock through renovation

projects which should not solely focus on energy aspects but also encompass the health dimension of the building by addressing the IEQ/IAQ issue. Financial incentives could support the implementation of technical building systems instrumental in this regard such as mechanical ventilation systems.

8. Energy Performance Certificates

Article 19 § 5-8

5. The energy performance certificate shall include recommendations for the cost-effective improvement of the energy performance and the reduction of operational greenhouse gases emissions and the improvement of indoor environmental quality of a building or building unit, unless the building or building unit already achieves at least energy performance class A.

The recommendations included in the energy performance certificate shall cover:

(a) measures carried out in connection with a major renovation of the building envelope or technical building system or systems; and

(b) measures for individual building elements independent of a major renovation of the building envelope or technical building system or systems.

6. Where Member States provide for a renovation passport to be drawn up and issued jointly with the energy performance certificate pursuant to Article 12(3), the renovation passport shall substitute the recommendations pursuant to paragraph 5 of this Article.

7. The recommendations included in the energy performance certificate shall be technically feasible for the specific building and shall provide an estimate for the energy savings and the reduction of operational greenhouse gas emissions. They may provide an estimate for the range of payback periods or costs and benefits over its economic life cycle and information on available financial incentives, administrative and technical assistance, as well as financial benefits which are broadly associated with the achievement of the reference values.

8. The recommendations shall include an assessment of whether the heating systems, ventilation systems, air-conditioning systems and domestic hot-water systems can be adapted to operate at more efficient temperature settings, such as low temperature emitters for water based heating systems, including the required design of thermal power output and temperature and flow requirements.

EVIA Recommendations: it is essential that energy performance certificates evaluate the functioning/performance of the technical building systems in order for appropriate recommendations to be made as regards which equipment should be implemented or replaced. To ensure that indoor environmental quality is improved through the recommendations, it is key that they foresee the implementation of a mechanical ventilation system in the building if there is none or that the existing one be replaced if it is not operating properly or if it is too old. Indeed, the latest mechanical ventilation systems, complying with the current ecodesign regulation, are particularly efficient to optimise the energy consumption of buildings and have a very low self-electricity consumption. As required by paragraph 8, they are capable of limiting flows only to what is strictly necessary to ensure an adequate indoor environmental quality. Thanks to this controlled air renewal, energy losses induced for heating or cooling are thus minimised while complying with IAQ regulatory requirements.

It is also important that the thermal impact of air renewal through windows airing, which is uncontrolled and leads to increasing significantly the energy needs of buildings, be appropriately taken into account in the energy calculation methodology of the energy performance certificate. Today, in some Member States, this is not the case and leads to artificially minimising the impact of such an air renewal reducing substantially the relevance of implementing truly efficient ventilation systems. This proposal could materialise through retaining by default in the EPC energy calculation methodology a reference air renewal rate for window airing of 2,5 $m^3/h/m^2$ as foreseen in the upcoming revision of the ecodesign lot 6 regulation on ventilation. This would allow for a more realistic comparison with the optimised air renewal rates of mechanical ventilation systems and in turn lead to works recommendations enabling to reduce the energy consumption of buildings and contribute to an adequate indoor air quality.

9. Inspections

Article 23 §1 & §4

1. Member States shall lay down the necessary measures to establish regular inspections of the accessible parts of heating systems, ventilation systems and air-conditioning systems, including any combination thereof, with an effective rated output of over 70 kW. The effective rating of the system shall be based on the sum of the rated output of the heat generators and cooling generators.

4. The inspection shall include the assessment of the generator or generators, circulation pumps and, where appropriate, components of ventilation systems, air and water distribution systems, hydronic balancing systems and control systems. Member States may include in the inspection schemes any additional building systems identified under Annex I.

The inspection shall include an assessment of the efficiency and sizing of the heat and cooling generator or generators and of the main components thereof compared with the requirements of the building and shall consider the capabilities of the system to optimise its performance under typical or average operating conditions, using available energy-saving technologies, and under changing conditions due to use variation. Where relevant, the inspection shall assess the feasibility of the system to operate under different and more efficient temperature settings, such as at low temperature for water-based heating systems, including via the design of thermal power output and temperature and flow requirements, while ensuring the safe operation of the system. The inspection shall, where relevant, include a basic assessment of the feasibility to reduce on-site use of fossil fuels, for example by integrating renewable energy, changing energy source or replace or adjust the existing systems.

Where a ventilation system is installed, its sizing and its capabilities to optimise its performance under typical or average operating conditions relevant for the specific and current use of the building shall also be assessed.

Where no changes have been made to the system or to the requirements of the building following an inspection carried out pursuant to this Article, Member States may choose not to require the

assessment of the main component sizing or the assessment of operation under different temperatures to be repeated.

EVIA Recommendations: we propose to use standard EN 16798-17 as a basis for defining the procedures for inspecting stand-alone ventilation systems. In particular, the following sections:

- Clause 5.1 of the standard, which explains the objectives of the inspection and the contents of the inspection report:

The inspection report shall include:

— recommendations for improvements with an indication of their probable cost-effectiveness and any other benefits;

— an assessment of the system efficiency including maintenance and controls;

— an assessment of the sizing compared to the cooling and ventilation requirements of the building;

— characteristics of the air conditioning and/or ventilation system that can be compared to design specifications or inputs of energy calculations.

To go into further details, we recommend integrating in the inspection protocol the following:

- Clause 5.3 which sets out the guidelines for pre-inspection. Essentially, this involves gathering documentation in order to compare the design data with the actual data on site.
- Clause 6.4.2, which lists all the elements to be checked on a mechanical ventilation system: ducts, casing, filters, heat exchanger(s), supply and return air grilles, air inlets and outlets, controls and settings. For each component, a list of points to be checked is provided.
- Table 3, which specifies the contents of the report and refers for each line of the table to the clause in the standard detailing the purpose of the line. This table is reproduced below, and we have highlighted in yellow the items we consider most important:

Table 3 — Information to be given in the inspection report depending on the method

Information	Method		Part
	1	2	
General			
Name, address and status of the person and organization in charge of the inspection	X	X	—
Official designation and address of the property	X	X	—
Name and address of the building owner	X	X	—
Date of the inspection	X	X	—
Parts of the system that could not be inspected	X	X	5.4
Pre-inspection / Compliance with design documentation			
Status of the documentation or information, see Table 4, including identification of lacking and outdated documentation	X	X	5.3.6
Priority areas for the collection of missing information during the inspection on site	X	X	5.3.6
Priority areas for the inspection where the design installation appear to depart from good practice in a manner likely to affect its performance	X	X	5.3.6
Any difference between documentation and actual installed components	X	X	6.3, 7.3
Any difference between working or as-installed drawings and the actual system	X	X	6.3, 7.3
Aspects of the inspections simplified or reduced because of clear evidence that a good practice program of maintenance is being carried out	X	X	6.4.1.1, 7.4.2
Check of the system			
Evidence showing why parts could not be checked because they were not accessible	X	X	5.4
Building parts and components inspected and number of measurement performed	X	X	5.5
In case of presence of specific ventilation systems for the reduction in the concentration of specific gas (e.g. radon), the operation or not of these specific ventilation systems during the inspection	X	NA	6.4.1.4
State, integrity and cleanliness of the ductwork (including observations detailed in 6.4.2.2)	X	NA	6.4.1.5, 6.4.2.2
Total air flow rate extracted and/or supplied by the air handling unit	X	NA	6.2, 6.4.2.3
Electrical power consumed by the fan(s)	X	NA	6.2, 6.4.2.3
In case of a central system, the pressure before and after the unit and the air filter	X	NA	6.4.2.3
Missing, blocked, damaged air filters and blanking plates in place	X	NA	6.4.2.4
Frequency of air filter changing or cleaning, and time elapsed since the last change or cleaning as well as discrepancies between written records of air filter changes and visual evidence	X	NA	6.4.2.4
In case of use of manometers or magnehelic gauges to monitor pressure drop across the air filter, their condition and issues. Presence and conditions of air filter change warning devices or control systems (if existing).	X	NA	6.4.2.4
Condition and cleanliness of the heat exchangers	X	X	6.4.2.5

Information	Method		Part
	1	2	
Any evidence that occupants find the air delivery arrangement unacceptable	X	NA	6.4.2.6
Cleanliness and correct functioning of the air inlets and outlets	X	NA	6.4.2.6
The adequacy of air inlets and outlets according to 6.4.2.6	X	NA	6.4.2.6
If air flow rate measurements are performed, guidance to selection of air inlets/exhausts to be measured	X	NA	6.4.2.6
Results of the comparison of the settings of control that limit the operation of the ventilation systems with the periods when the building is in use	X	NA	6.4.2.8
In the cases where the ventilation system is considered to be producing excessive noise or vibration, or allowing cross-talk between spaces, the probable cause	X	NA	6.4.2.10.1
Assessment of the system			
The specific cooling load	NA	X	7.2
The specific cooling capacity	NA	X	7.2
Assessment of the air-conditioning efficiency	NA	X	7.2
Assessment of the sizing compared to the cooling and ventilation requirements of the building	X	X	5.1, 7.2
Assessment of the system efficiency including maintenance and controls	X	X	5.1
Characteristics of the air conditioning and/or ventilation system that can be compared to design specifications or inputs of energy calculations	X	X	5.1
Information on any parameters suspected to be useful to measure concerning energy efficiency of the refrigerator	NA	X	7.4.2
Measurements carried out	X	X	—
Comments on faults found	X	X	—
Recommendations and advice			
Advice to keep any documentation determined in 5.3, any survey or calculation in a file so they are available for subsequent inspections	X	X	5.3.5
Advice to building manager on issues to address when developing a plan to complete the documentation	X	X	5.3.6
Advice regarding cleaning of exhaust and supply systems to ensure a good air quality	X	NA	6.4.1.5
Advice for improvement including the adjustments to be made to ensure that it agrees with the design	X	X	6.5, 7.5
Proposals to improve the results in terms of energy impact, including possible replacement of the system, subsystems or components and the economic justification of choices	X	X	6.5, 7.5
Advice on location, function and settings of controls, sensors and indicators	NA	X	7.4.7
Advice to the owner to reduce energy consumption if energy consumption recordings show that the equipment in not running in accordance with the use of the building	NA	X	7.4.8
Advice to record meter readings on regular basis if meters are installed but no consumption records are available	NA	X	7.4.8
Advice on the use of shading devices	NA	X	7.5
Final comment about the systems performance	X	X	—

The standard defines 3 levels of inspection: a first level based on visual checks, a second level which supplements the first with a few measurements, and a third which includes more detailed measurements.
We recommend applying level 1 and adding to it at least the measurement of the following points:

- total air flow taken in and/or supplied by the air handling unit (supplied air and extracted air in the case of a balanced system) ;
- electrical power consumed by the fan(s);
- in the case of a ducted system, pressure before and after the unit and the air filter.

The checks detailed above should be carried out every two years.
In addition, the following measurements should be carried out at the first inspection when the product is initially installed and every 6 years thereafter:

- measurement of airflow at the exhaust vents,
- measurement of air permeability of networks (in accordance with standard EN 12599).

In formalising their inspection scheme, Member States should valorise ventilation systems having the capacity of carrying out a self-diagnosis of their functioning. This could materialise through a lightened inspection scheme compared to the standard one thanks to the direct supply by the ventilation system of equivalent data which would not have to be obtained through a measurement.

When, in the frame of the regular inspection of the ventilation system, non-conformities are revealed, the building owner/manager should be encouraged to correct them.

Paragraph 8: newly implemented ventilation systems in construction or renovation works should be inspected to ensure that they have been installed adequately and that they deliver their expected performance so that the building meets its designed energy performance and is compliant with the

minimum energy performance requirements. In case their inspection reveals non-conformities, the latter are to be corrected before the handover of the building.

10. Common General Framework for the calculation of energy performance of buildings

ANNEX I §1

1. Member States shall describe their national calculation methodology on the basis of Annex A to the key European standards on the energy performance of buildings, namely (EN) ISO 52000-1, (EN) ISO 52003-1, (EN) ISO 52010-1, (EN) ISO 52016-1, (EN) ISO 52018-1, (EN) ISO 52120-1, EN 16798-1 and EN 17423 or superseding documents. This provision shall not constitute a legal codification of those standards.

EVIA Recommendations: Member States, if they wish so, can use these standards, to define their calculation methodology. However, they are not obliged to do so and can formalise their methodology(ies) independently. The only requirement is that the calculation methodologies be described using the format of the annex of the standard. However, if the format is not fit for that purpose, Member States should be allowed to explain their methodology(ies) in their own way.

11. Comparative methodology framework to identify cost-optimal levels of energy performance requirements for buildings and building elements

ANNEX VII

The comparative methodology framework shall enable Member States to determine the energy and emission performance of buildings and building elements and the economic aspects of measures relating to the energy and emission performance, and to link them with a view to identifying the cost-optimal level to achieve the 2030 emission reduction and climate neutrality goals, as well as a zero-emission building stock by 2050 at the latest.

The comparative methodology framework shall be accompanied by guidelines outlining how to apply that framework in the calculation of cost-optimal performance levels.

The comparative methodology framework shall allow for taking into account use patterns, outdoor climate conditions and their future changes according to best available climate projections, including heat and cold waves, investment costs, building category, maintenance and operating costs (including energy costs and savings), earnings from energy produced, where applicable, environmental and health externalities of energy use, waste management costs, where applicable, and technological developments. It should be based on relevant European standards relating to this Directive.

The Commission shall also provide:

- guidelines to accompany the comparative methodology framework; those guidelines will serve to enable the Member States to undertake the steps listed below,
- information on estimated long-term energy price developments.

For the application of the comparative methodology framework by Member States, general conditions, expressed by parameters, shall be laid down at Member State level. The Commission shall issue recommendations to Member States regarding their cost optimality levels, where relevant.

The comparative methodology framework shall require Member States to:

- define reference buildings that are characterised by and representative of their functionality and geographic location, including indoor and outdoor climate conditions. The reference buildings shall cover residential and non-residential buildings, both new and existing ones;
- define energy efficiency measures to be assessed for the reference buildings. Those may be measures for individual buildings as a whole, for individual building elements, or for a combination of building elements;
- assess the final and primary energy need and resulting emissions of the reference buildings with the defined energy efficiency measures applied;
- calculate the costs (i.e. the net present value) of the energy efficiency measures (as referred to in the second indent) during the expected economic life cycle applied to the reference buildings (as referred to in the first indent) by applying the comparative methodology framework principles.

By calculating the costs of the energy efficiency measures during the expected economic life cycle, the cost-effectiveness of different levels of minimum energy performance requirements is assessed by the Member States. That will allow the determination of cost-optimal levels of energy performance requirements.

EVIA Recommendations: as for article 5 paragraph 1, the comparative methodology framework to determine the energy and emission performance of buildings and building elements and the economic aspects of measures relating to the energy and emission performance should take fully into account the issue of indoor environmental quality. Indeed, fulfilling requirements regarding indoor environmental quality incur some energy consumption which are essential to factor in the

methodology. Especially, if, as proposed earlier, a part of the energy consumption of the building is earmarked for the operation of the mechanical ventilation so that it delivers the expected ventilation rate and contributes to maintaining an adequate indoor environmental quality.