



EUROPEAN
COMMISSION

Brussels, 30.6.2025
C(2025) 4132 final

ANNEX 3

ANNEX

to the

COMMUNICATION TO THE COMMISSION

Approval of the content of the draft Commission Notice providing guidance on new or substantially modified provisions of the recast Energy Performance of Buildings Directive (EU) 2024/1275

Energy performance certificates (Articles 19-21, Annex V) and independent control systems (Annex VI)

TABLE OF CONTENTS

1.	Introduction	3
2.	Energy performance certificate classes	3
2.1.	Setting energy performance classes, timeline and visual identity.....	3
2.2.	Definition of class A	5
2.3.	Definition of class G	5
2.4.	Distribution of classes B-F	6
2.5.	Class A+	7
3.	provisions on quality, reliability and affordability of EPCs	10
3.1.	Affordability.....	10
3.2.	On-site checks complemented by virtual means and visual checks.....	11
3.3.	Accessibility, legibility and machine-readable format.....	11
4.	Recommendations	13
4.1.	General aspects.....	14
4.2.	Operational greenhouse gas emissions.....	15
4.3.	Indoor environmental quality	15
4.4.	More efficient temperature settings	16
4.4.1.	Terminology for hydronic heating systems and key parameters	17
4.4.2.	Defining ‘low-temperature heating’	17
4.4.3.	Assessment steps proposed	17
4.5.	Remaining lifespan of heating or air-conditioning systems.....	18
5.	Validity of EPCs and simplified certification procedures.....	20
5.1.	Validity of EPCs	20
5.2.	Simplified update procedures.....	22
5.3.	Renovation advice to building owners	23
5.4.	Communication of revised EPC schemes	24
6.	Issuing and Displaying EPCs	24
6.1.	Trigger points	24
6.2.	Display of EPCs	25
7.	Annex V - Template for energy performance certificates	25
7.1.	Mandatory elements	26
7.2.	Voluntary elements	29
8.	Implementation of obligations under Annex VI	33
8.1.	Definition of a valid EPC	33
8.1.1.	Validity of the calculations	33

8.1.2.	Minimum number of elements differing from default or standard values	33
8.1.3.	Validity checks on input data	34
8.1.4.	Maximum deviation from the energy performance of a building	35
8.1.5.	Additional elements	37
8.1.6.	Validity and rating of an EPC following an assessment by the independent control system.....	37
8.2.	Analysis of the quality of the independent control system for EPC schemes.....	39
8.2.1.	Definition of quality objectives in Member States	39
8.2.2.	Evaluation of the quality level through sampling	39
8.2.3.	On-site visits for verifying input data	41
8.2.4.	Delegation of EPC schemes and independent control systems.....	42
8.3.	Quality management of EPC schemes	42
8.3.1.	Qualification and certification.....	43
8.3.2.	Training	43
8.3.3.	Embedded control and advice in calculation tools or EPB databases.....	43
8.3.4.	Ongoing quality control and verification	44
8.3.5.	Enforcement / penalties.....	45
8.3.6.	Total quality management.....	45
8.4.	Independent control systems and EPB databases.....	45
8.5.	Availability of EPCs	46
8.6.	Public disclosure of information on quality levels.....	46
8.6.1.	Differences between the calculated/estimated and measured energy performance ...	47

ANNEX 3 OF 13

to the

Commission Notice providing guidance on new or substantially modified provisions of the recast Energy Performance of Buildings Directive (EU) 2024/1275

Energy performance certificates (Articles 19-21, Annex V) and independent control systems (Annex VI)

1. INTRODUCTION

This guidance document provides clarifications and practical recommendations on how to implement and make operational most of the requirements regarding energy performance certificates (EPCs) which have been substantially updated or added in the recast Energy Performance of Buildings Directive (EPBD), Articles 19-21 and Annexes V and VI.

2. ENERGY PERFORMANCE CERTIFICATE CLASSES

2.1. Setting energy performance classes, timeline and visual identity

Article 19 of the recast EPBD, with Annex V, sets the framework for classifying buildings. At opposite ends of the scale, class A is for zero-emission buildings, and class G corresponds to the very worst-performing buildings in the national building stock at the time when the scale was introduced. Member States that on 29 May 2026 already designate zero-emission buildings as A0 may continue to use that designation instead of class A. For the remaining classes from B to F, or A to F for Member States using A0, Member States have to ensure an appropriate distribution of energy performance thresholds among the energy performance classes.

The introduction of classes A to G, with definitions for classes ‘A’ and ‘G’, is a step towards a clearer and simpler way to classify buildings in each country and across the EU. It is also crucial for removing barriers in the EU-wide housing market and it will facilitate the work of cross-border players such as banks, insurance companies, financial operators, construction companies and real-estate companies. However, a direct comparison of buildings across countries based only on their classes could be misleading and imprecise given the possible differences between national methodologies for calculating energy performance.

The energy performance of the building must be expressed in the EPC as a number indicating primary energy use in kWh/(m².y), while the energy performance class must be expressed as a letter from a closed scale from A to G. The energy performance of the building must be determined in accordance with Annex I, to be consistent with the use of energy performance as the key metric and indicator in other provisions in the EPBD. The reference to closed scales means that each class should be defined by an upper and lower value and be clearly distinguished from the adjacent classes.

Of particular relevance in this context is the provision in Annex I (point 1, fourth subparagraph) which clarifies that the energy performance of a building must be expressed by a numeric indicator of primary energy use per unit of reference floor area per year, in kWh/(m².y) for the purposes of both energy performance certification and compliance with minimum energy performance requirements.

The national classification scheme should therefore establish that the attribution of classes must be based on energy performance, which should be calculated in accordance with Annex I.

Member States may continue to use a methodology based on reference buildings to classify buildings, provided they comply with the requirements for establishing and attributing classes A-G based on energy performance.

Alongside EPC classes based on energy performance, Member States may add further indicators to the EPC. Member States may for instance consider establishing additional greenhouse gas (GHG) emission classes (optional indicator in Annex V.2b) to show how far the building is from being climate-neutral. However, such a voluntary additional classification can only work as a secondary rating, for instance to raise awareness about specific aspects and issues. It cannot be a substitute for the obligatory classes based on energy performance.

Article 19(1) further indicates some of the mandatory elements to include in the EPCs, which are complemented by the provisions in Annex V regarding mandatory and voluntary elements for EPCs (see Section 7).

Article 19(3) requires Member States to ensure that EPCs have a common visual identity throughout their territory. This is already common practice now and ensures that, even though EPCs are issued by several different operators, they are based on the same calculation and assessing methods and they have a uniform look across the country. Member States have some discretion to adapt the visual identity to address differences across regions and should also take into account regional or linguistic differences within their territories, making the information accessible to the public.

As regards the timeline for transposing and implementing such requirements, as for most other provisions in the EPBD, Member States have until 29 May 2026 (transposition deadline) to make sure that their national classification scheme is in line with the new provisions. If necessary, they must redefine the national energy performance classes for buildings by then, and adapt the methodology used to attribute them. An exception applies to Member States that already rescaled their energy efficiency classes between 1 January 2019 and 28 May 2024. The date of rescaling is taken as the date of official publication of the legal act or equivalent document that defines the energy classes. These Member States may postpone the introduction of the new classification scheme required by Article 19(2) until 31 December 2029 at the latest. This exception ensures that national classification systems are not changed too often, to have stability in the classification system for operators in the market and building owners. For Member States where EPCs are defined and managed at regional level, it is understood that the obligation applies at regional level.

While not specifically mentioned in Article 19, Member States may attribute different energy performance levels and classes to different building categories and types of both residential and non-residential buildings. This is a common and good practice already now, and it is justified by the differences in energy use patterns and building types. Member States may also differentiate energy performance levels based on climatic zones in the country. The differentiation of classes between building categories will also have the advantage of facilitating monitoring and compliance with specific provisions on individual buildings, such as minimum energy performance standards based on Article 9.

This approach is also consistent to the energy demand level which constitutes one of the criteria for zero-emission buildings (class A). Under Article 11(2), a maximum threshold must be set for the energy demand of a zero-emission building. Under Article 11(6), this energy demand threshold may be set by building type and with reference to climate zones within a country. Maximum thresholds could also be different for new and existing buildings being renovated.

2.2. Definition of class A

Under Article 19(2), from 29 May 2026, EPCs must specify the energy performance class of a building based on a closed scale using the letters from A to G.

The article stipulates that the letter A is for ‘zero-emission buildings’. A clear equivalence is therefore established in the legal framework between the definition of ZEBs and the attribution of class A. The definition of a ZEB includes criteria that go beyond energy performance. Notably, it requires the absence of on-site carbon emission production from fossil fuels and zero or a very low amount of operational greenhouse gas emissions; energy demand must be below a given threshold and total primary energy use on an annual basis must be covered by a closed list of energy sources. These criteria are set out in Article 2 and are further specified in Article 11 of the EPBD, while the guidance in Annex 7 on zero-emission buildings provides detailed clarifications on these provisions.

This means that even buildings whose energy consumption is within the range set at national level for class A in kWh/(m².y) would also need to meet the other ZEB requirements in order to be labelled as class A.

As a consequence, if a building has an energy performance level that meets the threshold set at national level for class A but does not meet the other ZEB requirements, for instance because the building is heated by a gas or oil boiler and hence has on-site carbon emissions, it should be attributed a lower-class B.

In the assessment, therefore, the EPC-certifier must consider the other mandatory criteria for ZEBs, such as the absence of emissions from technologies that use fossil fuels for heating and cooling.

For the purpose of establishing EPC class A, Member States need to use the maximum energy demand threshold for ZEBs in place when the new EPC scale is introduced. The maximum threshold should be used to set the maximum value of energy performance for class A (the minimum being equal to zero). While the maximum threshold must be revised every time the cost-optimal levels are revised (every five years), there is no obligation to update the EPC class A and rescale it every time the cost-optimal levels are revised.

Under Article 19(2), Member States that already designate zero-emission buildings as defined in Article 2 and Article 11 as class ‘A0’ before 29 May 2026, may continue to use this instead of class ‘A’. The remaining classes would then be ‘A’ – ‘G’.

2.3. Definition of class G

Under Article 19(2), letter G represents the lowest step of the scale and corresponds to the very worst-performing buildings in the national building stock when the scale is introduced. The definition of class G should not set a highest maximum energy use; only the threshold corresponding to the ‘border’ with class F should be defined. The worst-performing buildings are those with the poorest energy performance and therefore with the highest value for primary and final energy use (kWh/m².y) in the national building stock. Member States have to provide a definition of worst-performing buildings in their national building renovation plans.

The stipulation that only the very worst-performing buildings should be rated as G class means that Member States should make sure class G is not populated by an overly large share of the building stock. A very large share of the overall building stock categorised as class G might jeopardise proper monitoring of the building stock and would make it difficult to track and document improvements to its energy performance. Moreover, it would make it more difficult to put in place measures specifically targeting the buildings segment(s) with the

lowest energy performance. In addition, if too many buildings are categorised as very worst-performing, there will be less differentiation within the other classes.

As a benchmark for defining energy performance under class G, Member States are encouraged to consider the threshold used in the EPBD for the purpose of establishing minimum energy performance standards for non-residential buildings established under Article 9. This threshold matches the maximum level of energy performance of the lowest 16% of the building stock (by number of buildings or floor area). Accordingly, a benchmark inside the range of 14-18% of the building stock (residential or non-residential) would be considered ideal. Alternatively, Member States could also link class G to both their 2030 and 2033 targets for non-residential buildings. This would result in a class G for residential buildings representing 26% of the building stock. While this gives a comparatively large G class for a relatively short period of time, it also provides longer term stability for the EPC classification. The total number of buildings in G class should not exceed 26% to avoid overcrowding class G.

2.4. Distribution of classes B-F

While energy performance classes A (plus A0 and A+) and G are defined by specific criteria, under Article 19(2) the remaining classes B to F (or when ‘A0’ is used, A to F) have to be distributed appropriately. ‘Appropriate’ in this case is understood as meaning not resulting in artificially small or large classes. This may be achieved by a more or less ‘even bandwidth’ – a similar-sized range of energy performance indicators for each class – allowing proportionate steps from the upper limit of class G until the energy performance level representing the lower bound of class A.

Figure 1: Example of even bandwidth energy performance classes in primary energy use in kWh/(m².y)



This approach has the advantage of simplicity as even ranges between the scales are easy to understand. Each class represents a clear and equal step in the scale. Another advantage is its consistency, as with an even bandwidth the difference between adjacent scales (e.g. B to C or D to E) remains constant.

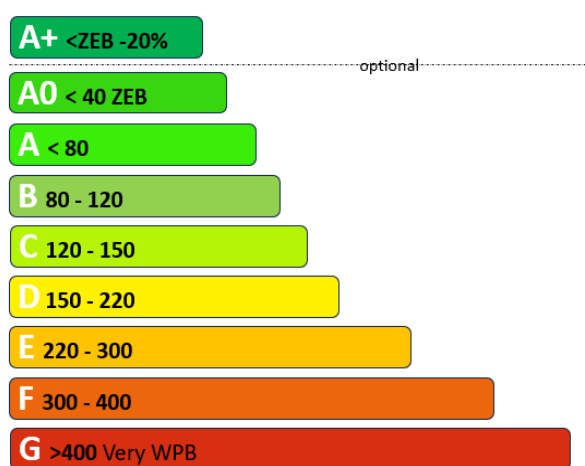
Such a classification system will be able to show the improvement in energy performance over time by changes in the population of the classes in a clear way. However, it will result in different populations of buildings in each class. If some classes are disproportionately populated, the bandwidth may be adapted to avoid empty classes across the scale. At the same time, it is expected that some classes will be emptier than others. For example, class A and B will be less populated than class D or E. Member States therefore have to decide on how an

appropriate distribution of scales can be best applied to their national building stock, taking account of the current energy performance.

Figure 2 shows an example using an appropriate bandwidth with not evenly distributed scales. It also shows a case with an A0 class in the scale.

For residential buildings, Member States may consider the potential synergies of distributing the scales in such a way that, together, EPC classes E, F, and G cover the worst-performing 43% of buildings, a figure significant for the purposes of Article 9(2). This would mean that the lower boundary of the primary energy performance indicator for the letter ‘E’ would have to be the same as the threshold for the worst-performing buildings. According to Article 9(2), ‘Member States shall ensure that at least 55% of the decrease in the average primary energy use referred to in the third subparagraph is achieved through the renovation of the 43% worst-performing residential buildings’. This correspondence would make it easier for building owners and authorities to identify the worst-performing buildings for implementation of Article 9(2) on residential buildings.

Figure 2: Example of a varying bandwidth energy performance classes with the optional ‘A0’ class (primary energy use in kWh/m² per year)



2.5. Class A+

Article 19(2) allows Member States to establish an A+ energy performance class. Class A+ is therefore voluntary and, when introduced, will represent the very top of the scale.

If Member States decide to introduce such a class, it will become an integral part of their EPC system. The A+ energy performance class defined by Member States must meet the following criteria:

- (1) the buildings' energy demand should must be at least 20% lower than the maximum threshold for ZEBs under class A;
- (2) in line with Article 11, buildings using any amount of fossil fuels while otherwise complying with the energy demand indicators would not qualify for class A or A+;
- (3) buildings must generate more renewable energy on site annually than their total annual primary energy demand;
- (4) in addition to energy performance, class A+ is relevant to life cycle global warming potential (GWP) because Article 19 requires Member States to ensure that for existing buildings renovated to A+ class, the life-cycle GWP is estimated and disclosed in the building's energy performance certificate. It should be noted that the Union framework for the methodology for life-cycle GWP calculation, set out by the

European Commission in the delegated act to be adopted by 31 December 2025, in accordance with Article 7(3), is designed only for the purpose of life-cycle GWP calculations of new buildings. To estimate the life-cycle GWP in relation to existing buildings undergoing renovation, Member States are free to adapt the methodology with the necessary steps or to use their own calculation methodology, in accordance with the relevant standards.

Criterion 3 is the one that most clearly identifies a building as being ‘positive’. It requires the building to generate more renewable energy on site than the total amount of energy that it would demand from the grid. In this calculation, special care must be taken when considering renewables. The following numerical examples clarify the concept.

Example A: the threshold for primary energy demand is set at 65 kWh/(m².y)¹.

A building has the following energy needs (before system inefficiencies or primary energy factors (PEFs) are accounted for):

Total energy required by the system (before renewable energy sources (RES) are taken into account)	
Heating	55
Domestic hot water (DHW)	15
Others (e.g. ventilation, lighting)	5
Total	75

The building analysed uses a heat pump and has photovoltaic (PV) panels installed. The distribution of energy would be as follows:

Energy required by the system (per carrier)	Energy use (FE)	Energy carrier	PEF	PE
Heating (HP - electricity)	11.0	Electricity	1.5	16.5
Heating (HP - ambient)	44.0	Ambient	0.0	0.0
DHW (HP - electricity)	3.8	Electricity	1.5	5.6
DHW (HP - ambient)	11.3	Ambient	0.0	0.0
Others (e.g. ventilation, lighting)	5.0	Electricity	1.5	7.5
RES (PV - used on site)*	15.0*	Electricity*	0.0*	0.0*
RES (PV - exported)	5.0	Electricity	-0.9	-4.5

* PV electricity generated and used on site would displace grid electricity before the PEF=0 is applied (an equivalent approach would be to make PEF=(-1.5) for PV electricity generated and used on site).

Total energy demand (before PV exported)	7.1
Total energy generated on site	-4.5

¹ This applies to examples A, B, C.

Energy balance	2.6
-----------------------	-----

In the scenario above:

- the building would comply with criterion 1 related to the threshold for energy demand (Building ED 1.1 < (65- 65*20%));
- the building would comply with the no-fossil fuel on-site criterion (heat pump installed);
- the building would not comply with the requirement on energy generation (criterion 3) as the energy demand is more than the RES generated on site.

In order to fulfil the A+ criteria the building could increase the amount of PV generated on-site or reduce the energy demand. The following examples B and C both comply with criteria 1-3.

Example B: increasing PV generated on-site.

Energy required by the system (per carrier)	Energy use (FE)	Energy carrier	PEF	Primary energy PE
Heating (Heat pump HP - electricity)	11.0	Electricity	1.5	16.5
Heating (HP - ambient)	44.0	Ambient	0.0	0.0
DHW (HP - electricity)	3.8	Electricity	1.5	5.6
DHW (HP - ambient)	11.3	Ambient	0.0	0.0
Others (e.g. ventilation, lighting)	5.0	Electricity	1.5	7.5
RES (PV - used on-site)*	15.0*	Electricity*	0.0*	0.0*
RES (PV - exported)	10.0	Electricity	-0.9	9.0

Total energy demand (before PV exported)	7.1
Total energy generated on-site	-9.0
Energy balance	-1.9

Example C: reducing energy demand.

Energy required by the system (per carrier)	Energy use (FE)	Energy carrier	PEF	PE
Heating (HP - electricity)	9.0	Electricity	1.5	13.5
Heating (HP - ambient)	36.0	Ambient	0.0	0.0
DHW (HP - electricity)	3.8	Electricity	1.5	5.6
DHW (HP - ambient)	11.3	Ambient	0.0	0.0
Others (e.g. ventilation, lighting)	5.0	Electricity	1.5	7.5
RES (PV - used on-site)*	15.0*	Electricity*	0.0*	0.0*
RES (PV - exported)	5.0	Electricity	-0.9	-4.5

Total energy demand (before PV exported)	4.1
Total energy generated on-site	-4.5
Energy balance	-0.4

3. PROVISIONS ON QUALITY, RELIABILITY AND AFFORDABILITY OF EPCs

Article 19(4) requires Member States to ensure the quality, reliability and affordability of EPCs.

3.1. Affordability

Measures to ensure that EPCs are affordable for building owners may depend on specific national or local circumstances and therefore Member States are recommended to assess whether in specific circumstances EPC market prices are too high. To reduce the costs for owners, measures could be taken either to reduce the amount of work involved for assessors (thus limiting the cost of producing EPCs), or to avoid market imbalances and speculation. Alternatively, dedicated support for vulnerable households could be considered.

The use of standard protocols with default values, or virtual means (see also Section 3.2) could reduce the time needed to produce and issue an EPC and therefore its costs. In relation to those measures, Member States are recommended to strike a balance between costs and quality of EPCs based on their national circumstances.

Price caps could also be set at national level with the aim of keeping the costs for building owners within limits and avoiding speculation. In this case too, the price caps should allow for the issuance of a quality EPC. Experience with the use of price caps in some Member States has shown the importance of regularly indexing the price caps.

Article 19(4) specifically requires Member States to consider whether to provide financial support for vulnerable households to make EPCs more affordable. Member States might for instance consider setting up specific support measures for low-income households or extending financial schemes supporting energy renovations to cover the cost of EPCs (e.g. before and after a renovation) for low-income building owners.

3.2. On-site checks complemented by virtual means and visual checks

Article 19(4) requires Member States to ensure that EPCs are issued on the basis of an on-site visit, which may be carried out, where appropriate, by virtual means with visual checks. In either case, the quality and reliability of EPCs must be ensured.

Physical on-site visits are preferred because they allow for a seamless assessment and a direct interaction between the independent expert and the building owner/representative. Nevertheless, experience has shown that virtual visits can, if appropriately carried out, be a valid alternative to physical visits. They could improve the affordability of EPCs especially in cases where on-site visits would require disproportionate logistical efforts (e.g. in remote areas). Member States may want to lay down criteria and conditions for the cases in which virtual checks can replace on-site visits.

As a general rule, a virtual building visit would be considered appropriate if the independent energy expert is able to carry out the same type of assessment based on the same level of access to the building as they would have during a physical visit and if it results in the same level of quality. A virtual visit could also be used to confirm the validity of data obtained through other means (e.g. plans, drawings, technical specifications). Access should include all relevant parts of the building or building unit, including for instance the cellar, the heating system, the roof, the garden or yard, and at least one flat, as well as a clear view of details of the windows/doors.

The issuance of an energy performance certificate by virtual means with visual checks would typically be based on a building visit in an online environment. In practical terms, to accomplish a virtual building visit, the building owner or their representative (building manager, construction supervisor, etc.) on-site would connect virtually with the independent energy expert, for example via a video-call platform. For residential buildings, these virtual visits could be organised via virtual platforms commonly available and familiar to the public. For big non-residential buildings it might be more appropriate to use special video platforms that allow for a 360° video conferencing. From a technological point of view, the building owner or building representative would need to provide a stable internet connection and an electronic device (smart phone, tablet, laptop etc.) with a camera of sufficient quality.

Where necessary and appropriate, a virtual building visit should be supported by additional documents and photos, collecting and showing specifications of selected building systems such as heating or ventilation systems. EPC experts/assessors might draw up checklists to inform building owners about the necessary preconditions and/ or additional data needs.

If the technical preconditions are not met and the assessment cannot be carried out at a sufficient level of quality, the virtual inspection would need to be repeated or complemented by a physical visit.

The independent expert/assessor is ultimately responsible for determining the validity of a virtual visit for the purposes of producing an EPC. If the independent expert determines that a virtual visit may result in an EPC of insufficient quality (e.g. the expert is not capable of identifying key parameters through the virtual visit), then the expert will need to proceed with an on-site visit. Similarly, an on-site visit cannot be used by the independent expert to justify errors or inaccuracies in the EPC.

3.3. Accessibility, legibility and machine-readable format

Article 19(4) establishes that ‘the energy performance certificates shall be clear and easily legible, available in a machine-readable format’, while Annex V specifies that ‘persons with disabilities shall have equal access to the information in energy performance certificates’. As

Article 20(1) of the EPBD establishes that EPCs should be issued in a digital format, unless a paper version is requested, the following recommendations mostly refer to digital documents.

Machine-readable

Directive (EU) 2019/1024 on open data and the re-use of public sector information defines the concept of machine-readability at EU level as a format structured in such a way as to allow software applications to easily identify, recognise and extract specific data from it². Some examples of machine-readable formats are CSV, JSON or XML. Data that are coded in a file format which limits their extraction or automatic processing cannot be considered machine-readable³. For example, printed or hand-written documents that have subsequently been digitalised are not machine-readable, but the equivalent text in a simple ASCII text file can be processed by a machine⁴.

Accessibility and legibility

The introduction of accessibility and legibility requirements for EPCs has been recognised as an significant step towards inclusion for people with disabilities⁵. EU legislation contains not only accessibility requirements for the built environment but also for (digital and non-digital) information, including websites. The legislation is supplemented by recommendations for which accessibility requirements to use in specific circumstances.

Relevant requirements on the accessibility of products and services (and the built environment in which the services are provided) for people with disabilities are also provided in Annexes I and III of Directive (EU) 2019/882 on the accessibility requirements for products and services (European Accessibility Act)⁶. While EPCs as such fall outside the material scope of that Directive, the annexes to the Directive nonetheless lay down requirements that are relevant to the information provided in the EPC's⁷.

To be accessible, non-digital EPCs should comply with the following requirements.

- Labels and instructions should be made available via more than one sensory channel, presented to users in ways they can understand and perceive, with fonts of suitable size and shape, with sufficient contrast and adjustable spacing between letters, lines and paragraphs.

To be accessible, digital EPCs should:

- (i) be made available via more than one sensory channel;
- (ii) be presented in an understandable way, for example, using the same words in a consistent manner or in a clear and logical structure so that persons with intellectual disabilities can better understand them;
- (iii) be presented to users in ways they can perceive, for example, EPCs should be designed to allow for additional contrast in foreground images so that people with

² Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information (recast) [2019] OJ L172/56, available at: <https://eur-lex.europa.eu/eli/dir/2019/1024/oj> (last accessed 12 June 2024), art 2(13) and recital 35.

³ *ibid.*

⁴ <https://opendatahandbook.org/glossary/en/terms/machine-readable/>

⁵ Marie Denninghaus, 2024, *Energy Performance of Buildings Directive – first EU legislation to address accessibility of buildings*, available at: <https://www.edf-feph.org/energy-performance-of-buildings-directive-first-eu-legislation-to-address-accessibility-of-buildings/>.

⁶ Directive (EU) 2019/882 of the European Parliament and of the Council of 17 April 2019 on the accessibility requirements for products and services [2019] OJ L151/70, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32019L0882>.

⁷ *ibid.* Article 2.

low vision can see them; colour should not be used as the only way of conveying a certain piece of information (e.g. in the energy label illustration);

- (iv) be presented in fonts of suitable size and shape, taking account of foreseeable conditions of use and using sufficient contrast, as well as adjustable spacing between letters, lines and paragraphs;
- (v) with regard to content, be made available in text formats that can be used for generating alternative assistive formats to be presented in different ways and via more than one sensory channel; for example information provided by voice or Braille using screen readers;
- (vi) be accompanied by an alternative presentation of any non-textual content; for example, diagrams (such as the energy label illustration) should be accompanied by a text description identifying the main elements or describing key actions⁸.

Moreover, when providing EPCs on paper, the option for printing in Braille should be made available⁹.

4. RECOMMENDATIONS

The EPBD recast introduces several novelties as regards the EPCs recommendations for improving the energy performance of a building. The recommendations were already a mandatory part of an EPC but the EPBD recast has enlarged their scope. Recommendations in the EPC are expected to be concise, while a renovation passport (Article 12) is a more suitable place to explain in detail what specific improvements can be made to the building, providing much more comprehensive technical and practical information, including on the sequencing of steps.

This section covers the most relevant new requirements, which are also highlighted in the table below next to existing ones.

Table 1. Mandatory and voluntary elements for recommendations for improvements

	Mandatory	Voluntary
	Cover measures to improve energy performance	Provide an estimate for the range of payback periods or costs and benefits over its economic life cycle (new)
	Cover measures to reduce GHG emissions (new)	Provide information on available financial incentives, administrative and technical assistance (new)
	Cover measures to improve indoor air quality (new)	Provide information on the financial benefits broadly associated with achieving the reference values (new)
	Provide an estimate of energy savings and the reduction in operational GHG emissions (new)	Provide other information on related topics, such as energy audits, incentives (financial and other) and financing possibilities, or advice on how to increase the climate resilience of the building

⁸ *ibid.*, Annexes I and II.

⁹ *ibid.*

Elements / scope	Cover both (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	
	Include an assessment of whether the heating, ventilation, air conditioning and domestic hot-water systems can be adapted to operate at more efficient temperature settings (new)	
	Include an assessment of the remaining lifespan of the heating system or air-conditioning system. Where relevant, the recommendations must indicate possible replacements for the heating or air-conditioning system, in line with the 2030 and 2050 climate targets, taking account of local and system-related circumstances (new)	
	Provide an indication as to where the owner or tenant of the building or building unit can receive more detailed information, including as regards the cost-effectiveness of the recommendations made in the energy performance certificate	
	Contain information on the steps to be taken to implement the recommendations, contact information for relevant one-stop shops and, where relevant, financial support options	

4.1. General aspects

Under Article 19(5), EPCs must include recommendations for:

- making cost-effective improvements to the energy performance of the building;
- reducing operational greenhouse gases emissions; and
- improving the quality of the indoor environmental.

These last two have been added to the existing requirements on recommendations.

Another novelty is that the provisions on recommendations do not apply to buildings that already achieve energy performance class A. In the EPC of class A buildings (and by extension also A+ buildings) the section on recommendations could therefore be left empty.

The recommendations must address two types of measures: (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 system. This differentiation has not changed from the existing requirements.

The recommendations may also include an estimate for the range of payback periods or costs and benefits over the economic life cycle of the building 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.

Finally, if the EPC is issued together with or close in time to a renovation passport, under Article 19(6) the recommendations can be replaced by the renovation passport.

4.2. Operational greenhouse gas emissions

Under Article 19(5), EPCs must include recommendations for a cost-effective reduction in operational greenhouse gas emissions. Operational greenhouse gas emissions are defined as ‘greenhouse gas emissions associated with the energy consumption of the technical building systems during the use and operation of the building’ (Article 2(23)). This is new; the provisions on recommendations which were in force before the recast concerned only cost-effective measures to improve energy performance.

Measures for reducing operational greenhouse gas emissions combine those for improving energy performance through energy efficiency measures and those relating to the use of renewable energy produced on site. Therefore, all measures improving the energy performance of buildings also reduce in parallel operational greenhouse gas emissions. As the type of measures to improve energy performance and reduce GHG emissions are the same, what is required in the recommendations is to provide a clear ranking and to include in them the quantifiable impacts of the measures recommended in terms of reducing operational GHG emissions. To this end, Article 19(7) further specifies that the recommendations must include an estimate for the energy savings and the reduction of operational GHGs emissions.

4.3. Indoor environmental quality

Indoor environmental quality (IEQ) is defined as ‘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’ (Article 2(66)).

Article 19(5) provides that EPCs must include recommendations for the improvement of IEQ of a building or building unit. This new requirement links with other new measures in the EPBD recast targeting thermal comfort and IEQ (in particular Article 5(1), Article 8(3), and Article 13).

It will often be possible to recommend measures that improve energy performance and IEQ at the same time, but in other cases recommendations to improve IEQ should be specific and tailored to the use of the building (residential or non-residential).

Where existing and relevant, recommendations could make reference to the voluntary national requirements mentioned in Article 13 for the implementation of adequate IEQ standards in buildings to maintain a healthy indoor climate.

IEQ recommendations may include, depending on the specific conditions and use of the buildings:

- improvement of thermal insulation which will also reduce draughts and local thermal discomfort, both in winter and summer;
- passive cooling solutions, such as installation of solar shading devices, optimisation of ventilative cooling, and improvement of building thermal mass to address overheating issues; active cooling solutions (e.g. radiant or air-based systems, fans) can be used to cool when passive systems are insufficient to ensure comfort and health;
- upgrading of the current heating and/or cooling system or replacing it with a more energy-efficient one, e.g. with better thermal regulation;
- installation of a ventilation system, using heat recovery;
- measures to improve thermal comfort (e.g. adjusting the air temperature or improving the humidity level);

- installation of self-regulating devices for the separate regulation of the temperature in each room or in a designated heated or cooled zone of the building unit;
- installation of sensors that monitor the IEQ;
- installation of fixed controls that respond to the levels of IEQ;
- filter replacement, installation of air cleaners or components for air disinfection (where relevant);
- improvement of the performance or replacement of the existing ventilation system;
- if IEQ is already monitored in the building (voluntary indicator in Annex V.2)¹⁰, the recommendations for improvement can/should be based on it, if appropriate.

Although this is a new requirement in the EPBD, some Member States already have elements related to IEQ in their EPCs. For instance, in Greece, there is a specific box for ‘comfort conditions and quality of indoor air’. Summer comfort issues are included in the Romanian EPC¹¹. In Portugal, for each of the recommended measures to improve energy performance, the EPC can indicate if they have other benefits like thermal comfort, indoor air quality or acoustic comfort improvements¹².

4.4. More efficient temperature settings

Article 19(8) requires that the EPC recommendations also include an assessment of the potential for heating, ventilation, air conditioning and domestic hot-water systems to operate at more energy-efficient temperature settings. This assessment includes evaluating the feasibility of low-temperature emitters for water-based heating systems, which are designed to optimise energy efficiency and support the integration of renewable energy sources. This new element in the EPC recommendations also has links with other requirements in the EPBD recast for technical building systems, minimum energy performance requirements and inspections¹³, and is complemented by specific indicators in the EPC template¹⁴.

In the following subsections, clarifications of the relevant terminology and concepts related to low-temperature heating in hydronic systems are provided, together with the recommended

¹⁰ Annex V.2 includes two voluntary indicators in relation to IEQ: ‘the presence of fixed sensors that monitor the indoor environmental quality’, and ‘the presence of fixed controls that respond to the levels of indoor environmental quality’.

¹¹ Buildings Performance Institute Europe (BPIE), 2018, *The inner value of a building. Linking indoor environmental quality and energy performance in building regulation*, https://bpie.eu/wp-content/uploads/2018/10/The-Inner-value-of-a-building-Linking-IEQ-and-energy-performance-in-building-regulation_BPIE.pdf.

¹² CA EPBD (CT5) Certification and Training, *Status in 2022*. <https://www.ca-epbd.eu/Media/638373594077934858/CT5-Certification-and-Training-Status-in-2022-with-annex.pdf>; https://www.sce.pt/wp-content/uploads/2018/06/ADENE_certificado_energ%C3%A9tico_habita%C3%A7%C3%A3o.pdf.

¹³ Article 5(1) stipulates that ‘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.’ As the systems are part of the technical building system, they are also mentioned in Article 13(2): ‘Member States may set specific system requirements for technical building systems in order to facilitate the effective installation and operation of low-temperature heating systems in new or renovated buildings.’ According to Article 23(4), inspections are required to ‘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.’

¹⁴ The EPC template in Annex V includes as a mandatory indicator (e) ‘a yes/no indication whether the heat distribution system inside the building is capable to work at low or more efficient temperature levels, where applicable’. It also includes a voluntary indicator assessing the ‘feasibility of adapting the heating system to operate at more efficient temperature settings’.

assessment steps needed to determine the potential of heating systems to achieve energy-efficient performance within residential buildings. These sections are part of a broader technical report which will be issued separately from this guidance document.

4.4.1. Terminology for hydronic heating systems and key parameters

The following terms describe the temperature regimes in hydronic heating systems.

- The *system temperature* is the average of the supply and return temperatures in a heating system.
- The *supply temperature* refers to the temperature of the fluid supplied from the heat generator (e.g. boiler, heat pump) to the emitters.
- The *return temperature* is the temperature of the fluid returning from emitters to the generator.
- *Delta T* (ΔT) refers to the difference between supply and return temperatures, impacting system efficiency.
- The *excess temperature* is the difference between the average emitter fluid temperature and the ambient temperature, used for calculating emitter heat output.

Characterising the precise temperature regime of an existing heating system is complex and cannot rely on sporadically recorded low temperatures. Therefore, only two main parameters, the system design temperature and the seasonal average system, supply and return temperatures, are useful indicators of the heating system's operational regime and help to assess potential performance improvements in the energy performance certificate.

For existing buildings, determining these values involves assessing the current heat load and installed emitter capacity. Calculation tools, using data like climate zone, heat generator specifications and distribution flow data, can be used to estimate achievable system temperatures.

4.4.2. Defining 'low-temperature heating'

Low-temperature heating is typically recognised in standards such as EN 14825:2022 (for heat pumps) and EN 442:2014 (for metallic radiators and convectors). These standards classify heating systems by design temperatures:

- low temperature: $\leq 35\text{ }^{\circ}\text{C}$ for design supply temperature;
- intermediate: $\leq 45\text{ }^{\circ}\text{C}$;
- medium: $\leq 55\text{ }^{\circ}\text{C}$;
- high: $\leq 65\text{ }^{\circ}\text{C}$.

For EPBD purposes, the following definitions are proposed:

- medium-temperature regime: system design temperature $\leq 55\text{ }^{\circ}\text{C}$, seasonal average $\leq 50\text{ }^{\circ}\text{C}$;
- low-temperature regime: system design temperature $\leq 45\text{ }^{\circ}\text{C}$, seasonal average $\leq 42\text{ }^{\circ}\text{C}$.

4.4.3. Assessment steps proposed

To assess whether heating systems can be adapted to operate at more efficient temperature settings, the EPC expert/assessor could follow the simplified steps outlined below when there

is an existing emitter and distribution system, without considering limiting factors such as generators, circulators or room temperature control systems.

- (1) Calculate the heat load and heated surface of the building or building unit, and the reference room, using data such as final energy used for space heating, year of construction and insulation conditions.
- (2) Determine the emitter capacity in the reference room, including floor area, type and installation settings.
- (3) Determine the maximum flow rate of the distribution pipes.
- (4) Calculate the achievable system temperatures based on the acquired data.

The data collected from the steps outlined above could be entered into a dedicated simple calculation tool which could be used for step 4¹⁵.

Several actions could be included in the recommendations to help reduce system temperatures further in the reference room, for instance, additional insulation on outer walls, floors and ceilings. These improvements in insulation and airtightness are crucial for decreasing the heat load. Other measures include upgrading glazing and window frames to materials with higher insulating capacities, sealing gaps to enhance airtightness and replacing extract ventilation with heat recovery ventilation systems to optimise energy efficiency and heat retention. These recommendations might overlap with those aimed at improving the overall energy performance of the building.

Beyond reducing heat load, the recommendations could suggest increasing emitter capacity by replacing standard emitters with low-temperature ones of similar size or increasing the number or size of emitters. This modification supports more effective heat distribution at lower temperatures, ensuring compatibility with a low-temperature regime. The optimisation of flow rates within the distribution system by either maximising the flow in existing pipes or upgrading to one-size larger pipe dimensions could also be an effective measure. These adjustments further improve the system's efficiency, enabling it to operate effectively even under reduced temperature conditions.

Additionally, the assessor is recommended to check if other system properties could affect the implementation of lower system temperatures, in order to formulate specific recommendations for energy improvements. This involves:

- (1) determining the type of room temperature control system;
- (2) identifying the type and capacity of the generator and circulator/pump;
- (3) checking the heat load/emitter capacity-ratio in other critical rooms.

Once again, these steps help determine the best achievable flowrates and system temperature given the existing distribution system.

4.5. Remaining lifespan of heating or air-conditioning systems

Another new recommendation pertains to the 'mandatory assessment of the remaining lifespan of the heating or air-conditioning system' (Article 19(9)). This provision is linked to others in the EPBD recast: the projected lifespan of the heating systems has to be included in the data on the building system (Article 16(1)). Linked to those, a voluntary indicator in the EPC template (Annex V, 2.m) focuses on 'expected remaining lifespan of the heating or air-conditioning systems and appliances, where applicable'.

¹⁵ This tool is made available in a separate document and generates outputs to assess whether the dwelling and its heating system are compatible with low- or medium-temperature operation.

The remaining lifespan is an important indicator for building owners, which helps raising awareness on the expected end of life of such installations, so that replacements are planned in advance and supported by comprehensive information on the options available, instead of being driven by force majeure when a heating or air-conditioning system breaks down.

The remaining lifespan of heating and air-conditioning systems varies and depends mainly on its age. In some countries values for lifespans are standardised in national legislation. Based on existing literature¹⁶ and manufacturer's information, the following general indications can be used to assess it.

- A heating system can last from 7 to 25 years (average lifespan) depending on the type of heating system and specific technology, sometimes even longer.
- A modern heat pump has an average lifespan of 20-25 years, older models have an average life expectancy of 10-15 years.
- The average lifespan of an air-conditioning system ranges from 10 to 15 years

Several factors beyond the age of the heating or air-conditioning system influence the expected lifespan:

- the quality of installation;
- the regularity and quality of maintenance (e.g. regularly scheduled inspections in accordance with Article 23, filter replacements, cleaning, immediate repair of defective parts);
- the conditions of use (frequency and intensity, proper sizing).

To assess the remaining lifespan, the EPC expert/assessor must weigh the relevant factors above, based on the specific characteristics of the individual heating or air-conditioning system assessed.

Article 19(9) also requires that, where relevant, the recommendations must 'indicate possible alternatives for the replacement of the heating system or air-conditioning system'. This has to be in line with the 2030 and 2050 climate targets and also has to take account of local and system-related circumstances. If the EPC expert/assessor concludes that the remaining lifespan of the heating or air-conditioning system is quite short (e.g. approx. two years), alternatives to the existing system must be identified and indicated. In line with 2030 and 2050 climate targets and taking account of the lifespan of the new equipment, these alternative systems should be highly energy-efficient and non-fossil-fuel-based. It would also be very relevant to consider possible specific indications on boilers replacements in national legislation^{17, 18}.

¹⁶ Including: European Commission: Directorate-General for Energy, *Ecodesign impact accounting annual report 2021 – Overview and status report*, Publications Office of the European Union, 2022, <https://data.europa.eu/doi/10.2833/38763>.

¹⁷ In Denmark, EPC issuers must always consider the replacement of boilers that are older than 10 years. Handbook for Energy Consultants (HB2023), Appendix 4.4.7, paragraph 2; <https://www.hbemo.dk/haandbog-for-energikonsulenter-hb2023>.

¹⁸ In Germany, for example, all efficient heating systems that run on fossil fuels must be replaced as soon as they are 30 years old. This applies to all systems that heat with oil or gas and were installed before 1991. §72 of the 2024 Gebäudeenergiegesetz . <https://www.recht.bund.de/bgbl/1/2023/280/VO.html>

5. VALIDITY OF EPCs AND SIMPLIFIED CERTIFICATION PROCEDURES

5.1. Validity of EPCs

The recast EPBD has not changed the period for which the EPC is legally valid, which remains 10 years.

Given the long period of validity of the EPC, new EPCs will coexist with EPCs issued before the entry into force of the new requirements (by end of May 2026).

The EPBD provides flexibility on how to address this issue. Member States can decide which approach they want to follow. The main issues to evaluate when considering the validity of an EPC following rescaling are the following:

- clarity and understanding – how clear it is for the general public to understand the difference between old and new EPC scales;
- relationship with obligations – whether there are any relationships between the current EPC scales and obligations. This can affect minimum energy performance requirements (e.g. new buildings need to be at least ‘X’ on the EPC scale) or minimum energy performance standards if these are already in force in a Member State (e.g. buildings with EPC G need to be renovated by 2030);
- effects from other changes (e.g. calculation methodology) – whether there are changes to other EPBD requirements that could influence the EPCs. The clearest link is with the calculation methodology. Changes in the calculation methodology may result not only in differences in the value of the main indicator in the EPC (e.g. from 100 to 93 kWh/(m².y)) but also in the meaning behind the number (e.g. previously EPCs reported on non-renewable primary energy, while the new scale reports on total primary energy);
- support measures and financial instruments – if financial support under a specific scheme is linked to or dependent on a particular EPC classification, then changes in a building’s classification may result in a change of beneficiaries which might not be in line with the initial objectives of the funding scheme. For example, if a scheme required an improvement of at least 1 or 2 classes, it may be necessary to provide guidelines on how this is addressed. Similarly, if there are changes to the number or indicator (due to changes in the methodology), then a direct comparison may not be feasible without some processing of data;
- storage of EPCs – how EPCs are currently stored. If EPCs are stored in a database it is feasible to carry out certain measures (e.g. re-issuing them or re-calculating a class), which may not be feasible if they are not stored in a database, for instance.

The different options which could be considered are the following.

- (a) Old EPCs continue to be valid until the validity of the EPC expires following 10 years from their issuance.

New and old EPCs will operate and coexist until all old EPCs are expired, which will depend on when the scheme is updated. This could be by 2036 if EPC schemes are updated on the transposition date (see Article 35) or later if Member States have already updated their EPC schemes recently and make use of the exception under Article 19.

This option is simple in that the old EPCs continue to be valid and are unchanged. However, as multiple EPCs will coexist for a number of years, it is critical that the

administration communicates what are the effects when it comes to obligations (e.g. minimum energy performance standards or funding schemes).

- (b) Old EPCs remain valid only until a given date.

Old EPCs remain valid, but Member States provide an earlier date to end their validity. For example: all EPCs issued before the transposition date are valid until 1 January 2030. This approach is essentially similar to option A (validity until expiry), but it limits the period in which both schemes coexist and the negative impact this may have.

As with option (a), it is critical that the administration clarifies the effects in terms of obligations and funding schemes. Also, it is important that building owners are aware that old EPCs may not be valid for the full 10-year duration.

- (c) Old EPCs are no longer valid.

Under this option, old EPCs expire once the new scheme is introduced. This option is simple from an administrative perspective and eliminates confusion in terms of coexistence of both old and new system. However, this option would make many EPCs issued recently no longer valid and cause significant added costs to building owners.

- (d) Old EPCs are rescaled to its new label or value.

Old EPCs are automatically, or upon request, updated to their new value. Old EPCs that are not updated (either because it is not possible technically or because the update is not requested) expire.

This can be done centrally, particularly if EPCs (and input data used for the calculation of the energy performance class) are stored and available through databases. Under this option, the EPC managing authority establishes equivalences between the old and new EPC classes (e.g. an EPC with 150 kWh/(m².y) was a D in the previous labelling system and is now an E under the new system) or the new energy performance value (e.g. an EPC with 70 (kWh/(m².y) non-renewable energy was a D in the previous label and it is now 150 kWh/(m².y) total primary energy with an E label).

This option requires work from the EPC managing authorities, but it reduces the complexity that would ensue from the lack of coexistence of both systems. It also generates no additional costs for building owners, although they should be communicated of the new EPC values.

In this case, the validity of old EPCs is not extended following the re-classification. The validity of the EPCs would continue to be 10 years from the date of the issue of the original EPC.

Options (b) to (d) are provided as examples, whereas option (a) describes what will happen if no specific or additional measure is taken at national level beyond transposition of the requirements in Article 19. Member States may also choose different options for different building categories (e.g. option (a) for residential buildings and option (d) for non-residential). Under all options, communication to building owners, independent experts, building designers and the building sector as a whole remains the most important aspect.

It should be borne in mind that the EPC database and the storing of input data could support and facilitate the dynamic updating of EPCs (or some of their elements and indicators) over time, as in option (d). EPCs are generally understood as the result of an analysis at a given

moment (a snapshot of the energy performance and other qualities and characteristics of a building). Storing EPCs in a database makes it possible to use the input data for an EPC to keep the building rating up to date, and so to show changes in the buildings' energy performance over time when this depends on external/exogenous factors and the technical characteristics of the buildings itself are largely unchanged.

For example, due to the expected pace of decarbonisation of the electricity grid, significant changes in primary energy factors are expected in the coming years. Changes in the primary energy factor for electricity applied at national level could have an effect on a building rating. When the EPC is based on data stored in a database and certain parameters are updated, the EPC will have an evolving value over 10 years (the value of the EPC is the value provided when checking on the database). The validity of the EPC would still be linked to the date of the original input data, unless the input data are also updated.

5.2. Simplified update procedures

Article 19(14) requires Member States to introduce simplified update procedures in specific circumstances.

The aim of this provision is to facilitate the updating of the EPC when only limited changes are made to a building or when data and information are available from other reliable and relevant sources.

Member States should describe in their legislation which changes are eligible for simplified procedures and how these changes should be reflected in the EPC and the EPC databases.

The simplified procedure should be reflected in lower EPC-related costs for the building owner, given the reduced resources required to update the EPC compared to a full new EPC.

The validity of the EPC would depend on how Member States apply the simplified procedure. If the simplified procedure also requires the validation of existing input data (i.e. verification that there have not been any changes) then the validity of the EPC would be set from the moment the EPC is updated. If the simplified procedure does not require the validation of existing input data (i.e. the expert only vouches for the value of the element updated), then the validity of the EPC would remain linked to the date of the original input data.

Article 19(14) identifies three cases in which simplified procedures for updating an energy performance certificate have to be made available by Member States:

(a) Updating an energy performance certificate when individual elements are upgraded

Upgrading individual elements, by means of single or stand-alone measures, may not have a decisive impact on the calculation and composition of a building's overall energy performance and may therefore be handled differently from major renovations.

The simplified procedure for updating an energy performance certificate based on improvements to individual elements limits the assessment and issuing procedure only for these improved individual elements. For example, if the basement ceiling was insulated as an individual measure, although the full requirements for issuing an energy performance certificate (e.g. an on-site visit in accordance with Article 19(4)) still apply, the update of the energy performance certificate would focus exclusively on this aspect.

This focus may include a reassessment and revision on the updated energy performance certificate, of the energy performance indicator and class, indicator and class for operational greenhouse gas emissions, or indoor environmental quality. The revision might also result in the removal of a renovation recommendation, which might be related to the single or stand-

alone measure that was implemented, from the list of recommendations in the updated energy performance certificate, or in an updating of any other information listed in Annex V to the EPBD and included in the national EPC template, which may have changed following the single or stand-alone measure.

- (b) Updating an energy performance certificate when measures identified in a renovation passport are put in place

A simplified procedure may not be appropriate to update an energy performance certificate after the implementation of recommended measures in the existing energy performance certificate. This is because the recommendations contained in the energy performance certificate and their related information on their energy savings are not detailed and precise enough to be used for a recalculation of the energy performance certificate.

The situation will be different if a building renovation passport has been issued for the building in question, as this contains a ready-to-use, personalised renovation plan with all the measures to be carried out, including the expected benefits such as energy savings and reduced greenhouse gas emissions. If the measures in the building renovation passport are implemented as recommended, it can be assumed that the energy savings will be achieved as indicated. If these measures lead to a major renovation of a building, it will usually be necessary to update the energy performance certificate. Provided no major renovation is involved, the simplified procedure can be followed.

A simplified procedure in this case has to include a compliance check of recommended measures in the building renovation passport compared to the measures actually implemented. This must be carried out as part of an on-site visit in accordance with Article 19(4), by the energy expert responsible for issuing the energy performance certificate. If the energy expert concludes that the measures have been carried out in accordance with the recommendations of the building renovation passport, the corresponding data can be used to issue the updated energy performance certificate.

- (c) Updating an energy performance certificate when a building digital twin, other certified methods, or data from certified tools determining the energy performance of a building are used.

If new figures on the building's performance indicators are available, these can be used to update the energy performance certificate. New data may result if a digital twin has been set up for the building, and data included in it are changed following, for example, the implementation of renovation measures or other changes to building data relevant for the energy performance certificate, or if the energy performance has been determined on other occasions (e.g. sustainable building certifications) using certified methods or certified tools.

A simplified procedure in this case would involve adopting the determined data from the digital twin or certified method or tool for the EPC. Further calculations or on-site visits would only be required if data were missing or the energy expert discovered discrepancies.

5.3. Renovation advice to building owners

The recast EPBD introduces a new requirement to ensure that owners of buildings issued an EPC below level C are invited to a one-stop shop at the following points:

- when the EPC expires;
- when the EPC has reached 5 years after the last issuance.

The aim of the visit is to provide renovation advice to the building owner and encourage them to act upon it. This information could cover technical administrative and financial issues (see

the guidance on Article 17 and Article 18 in Annex 2 for more information on the scope of activities which could be covered and the options for inviting the building owners).

5.4. Communication of revised EPC schemes

The recast EPBD introduces significant changes to the EPC scheme. The rescaling is one of the most obvious, but the changes also affect the content of EPCs (e.g. template, recommendations), when the certificate must be made available, access to information through databases, quality elements, etc. The communication of all these changes will be a key aspect for the acceptance of the revised scheme.

It is therefore recommended that the revision of the EPC classes is communicated in detail and clearly, comparing the old and new provisions. Appropriate information campaigns and online frequently asked questions (FAQs) can support the swift acceptance of the new scale. Most Member States already have experience with a rescaling of the energy performance classes or introducing changes to their schemes.

Promotional campaigns lead to greater awareness among stakeholders and market players, but also among the public. Member States should consider launching separate campaigns, differentiating based on the target audience, e.g. campaigns for professional and stakeholder groups, and campaigns for end users such as building owners or tenants. These campaigns should convey the information in a manner commensurate with the target audience's level of knowledge. The Member States should consider adopting a clear comparative approach, to showcase the differences associated with the rescaling of the energy performance classes¹⁹. The Member States could also consider collaborating with social partners, non-governmental organisations and other stakeholders to streamline the dissemination of information among different audiences within the general public.

6. ISSUING AND DISPLAYING EPCs

6.1. Trigger points

Article 20(1) requires new EPCs to be issued for:

- (a) buildings or building units when they are constructed, when they have undergone a major renovation, when they are sold, when they are rented out to a new tenant, or for which a rental contract is renewed; and
- (b) existing buildings owned or occupied by public bodies.

The recast Directive therefore introduces more trigger points for the issuance of EPCs, including major renovations and the renewal of a rental contract. Moreover, it also expands the scope of the EPC requirement to encompass all existing buildings owned or occupied by public bodies²⁰, independently of the building's surface area.

In relation to major renovations, Article 2(22) provides two options for the Member States. As such, a renovation may be considered 'major' if:

- (a) the total cost of the renovation relating to the building envelope or the technical building systems is higher than 25 % of the value of the building, excluding the value of the land upon which the building is situated; or

¹⁹ For example, the French website: <https://rt-re-batiment.developpement-durable.gouv.fr/dpe-logement-a786.html?lang=fr>.

²⁰ 'Public bodies' means public bodies as defined in Article 2(12), of Directive (EU) 2023/1791 (Energy Efficiency Directive), which reads as follows: "‘public bodies’ means national, regional or local authorities and entities directly financed and administered by those authorities but not having an industrial or commercial character.'

- (b) more than 25 % of the surface of the building envelope undergoes renovation.

As regards buildings not owned or occupied by public bodies, the requirement for the issuance of an EPC is also triggered by the construction, major renovation, selling or renting out of a building or the renewal of a rental agreement for it. Furthermore, no new EPC need be issued if there is already an available and valid certificate, issued in accordance with either Directive 2010/31/EU or the EPBD recast.

As under the current rules, Member States will be able to exempt the categories of building referred to in Article 5(3)(b), (c) and (e)²¹ from the requirement to issue of an EPC. As regards residential buildings which are used or intended to be used for less than four months of the year or, alternatively, for a limited annual time of use and with an expected energy consumption of less than 25% of what would be the result of all-year use (Article 5(3)(d)), Member States which chose to exempt these buildings by 28 May 2024, may continue to do so.

Article 20 also provides greater clarity on the requirements relating to the availability of EPCs and checks or other controls to ensure that EPCs are available online and offline in advertisements of buildings on sale or rent, including in property search portal websites. These aspects are addressed in section 8 of this guidance on Annex VI.

6.2. Display of EPCs

Article 21 of the EPBD recast widens the existing obligation to display EPCs to all buildings occupied by public bodies and buildings frequently visited by the public, irrespective of their size. In addition, non-residential buildings which have a valid EPCs are also required to display it in a prominent and clearly visible place.

For buildings occupied by public bodies and frequently visited by the public and non-residential buildings, obligatory EPCs issued pursuant to the EPBD (irrespective of whether based on the previous or the recast EPBD) will need to be displayed. Where a building was not obliged to have an EPC under the previous EPBD, it would only be obliged to display the EPC once it is obliged to have an EPC. As an example, a shop which has an EPC issued in 2019 after a sale would need to display an EPC for as long as the EPC is valid (2029).

7. ANNEX V - TEMPLATE FOR ENERGY PERFORMANCE CERTIFICATES

Annex V, in reference to Article 19, provides a template to be used for EPCs in all Member States. Annex V includes a list of indicators that must be displayed in the EPC (Annex V 1.) and a list of voluntary indicators (Annex V 2.) for which Member States can choose whether to include them or not and in which circumstances. A few additional mandatory indicators are also indicated in Article 19(1). Additionally, Annex V specifies the data that have to be displayed on the energy performance certificate's front page.

Several of the indicators are to be read and interpreted in close connection to the requirements in Annex I which provides the general framework for calculating the energy performance of buildings.

While there are no specific requirements on the layout and how to present the assessed indicators, to improve the accessibility of EPCs, diagrams with a textual description of the

²¹ ‘(b) buildings used as places of worship and for religious activities’; ‘(c) temporary buildings with a time of use of two years or less, industrial sites, workshops and non-residential agricultural buildings with low energy demand and non-residential agricultural buildings which are used by a sector covered by a national sectoral agreement on energy performance;’ and ‘(e) stand-alone buildings with a total useful floor area of less than 50 m²’.

main elements or a description of key action points are generally recommended to accompany the values of the indicators (see Section 3.3 of this guidance).

7.1. Mandatory elements

The following section provides an overview of the mandatory elements to be displayed in the EPC. Tables 2, 3 and 4 list the indicator itself, the unit in which it has to be displayed, plus a reference where information is provided on how to calculate the indicator or where to find the information for the indicator.

Table 2. Mandatory elements on the energy performance certificate's front page

	Indicator	Unit	How to / Source
(a)	Energy performance class	A+, A-G	To be calculated according to the national methodology established following the requirements in Annex I and based on the requirements in Article 19-20 ²² .
(b)	Annual primary energy use - <i>displayed per energy carrier</i>	kWh/(m ² .y)	National calculation methodology established based on Annex I
(c)	Annual final energy use - <i>displayed per energy carrier</i>	kWh/(m ² .y)	National calculation methodology established based on Annex I
(d)	Renewable energy produced on site as a percentage of energy use	%	National calculation methodology established based on Annex I
(e)	Operational greenhouse gas emissions - <i>based on energy use</i>	kgCO _{2eq} /(m ² .y)	National calculation methodology established based on Annex I
(e)	Value of the life-cycle GWP (if available)	kgCO _{2eq} /(m ²)	To be calculated and reported in accordance with the Delegated Act referred to in Article 7(3)

The elements in the following table are mandatory but do not have to be displayed on the energy performance certificate's front page.

²² See sections 2.2 to 2.5 of this guidance.

Table 3. Mandatory elements on the energy performance certificate (Annex V)

	Indicator	Unit	How to / Source
(a)	Annual primary and final energy consumption <i>- displayed per system</i>	kWh / MWh	National calculation methodology established based on Annex I
(b)	Renewable energy production <i>- if applicable</i>	kWh / MWh	National calculation methodology established based on Annex I
(b)	Main energy carrier and type of renewable energy source <i>- if applicable</i>	e.g. electricity and PV	National calculation methodology established based on Annex I
(c)	Energy needs <i>Energy need is the energy that needs to be delivered to maintain the requirements for indoor environmental quality regardless of its source or the efficiency of systems.</i> <i>Displayed per system</i>	kWh/(m ² y)	National calculation methodology established based on Annex I
(d)	Indication of whether the building has a capacity to react to external signals and adjust the energy consumption <i>For example, whether the building is equipped with sufficient (digital) demand response and demand management capabilities</i>	Yes / No, description	To be indicated in accordance with Article 13
(e)	Indication of whether the heat distribution system inside the building is capable of working at low-temperature levels, where applicable	Yes / No, description	Linked to the requirements relating to the recommendations, see Section 4.4 of this guidance
(f)	Contact details for the relevant one-stop shop for renovation advice	e.g. name, address, webpage	One-stop shops as defined in Article 18

Not explicitly mentioned in Annex V, but required by Article 19(1), the energy performance certificate must include reference values such as minimum energy performance requirements, minimum energy performance standards, nearly zero-energy building requirements and zero-emission building requirements that enable owners or tenants to compare the energy performance of their building or building unit with the requirements for those at the top of the

scale. The EPC assessor should identify which requirements are most relevant for the building being assessed.

In addition, under Article 19.5, the recommendations for improvement must be included in the energy performance certificate. The table below summarises the mandatory elements under Article 19.

Table 4. Mandatory elements on the energy performance certificate (Article 19)

	Indicator	Unit	How to / Source
	Nearly zero-energy building requirements <i>- for new and existing buildings</i>	Maximum threshold	As set in Article 2(3), link to Article 5
	Zero-emission building requirements <i>- for new and existing buildings</i>	Maximum energy demand threshold; GHG emission threshold	Link to Article 11
	Minimum energy performance standards <i>- if applicable</i>	Final or primary energy threshold	Link to Article 9(1) for non-residential buildings or to national policies
	Minimum energy performance requirements <i>-where relevant</i>	Maximum thresholds	Reference values for major renovations, buildings elements or technical building systems in terms of U-value (W/m ² K) derived from the latest cost-optimal methodology. Link to Article 5
	Recommendations for cost-effective improvement of the energy performance, reduction of operational GHGs emissions and improvement of indoor environmental quality of a building or building unit <i>- unless the building or building unit achieves at least energy performance class A</i>	Description	

7.2. Voluntary elements

In addition to the mandatory indicators, Annex V provides a list of voluntary indicators that can be displayed on the EPC. Member States can either decide which of the voluntary indicators have to be included on the EPC or leave the decision on which to include to the issuer of the certificate. In general, the EPC is compliant without these voluntary indicators.

As for the mandatory indicators, the following table lists the indicator itself, the unit in which it has to be displayed in the energy performance certificate, plus a reference where information is provided on how to calculate the indicator, the legal basis or where to find the information for the indicator.

For some voluntary indicators, an accompanying text can be useful to describe the reasons for and the significance of the indicator.

Table 5. Voluntary elements of the energy performance certificate (Annex V)

	Indicator	Unit	How to / Source
(a)	Energy use <i>- displayed for each of the uses: space heating, space cooling, domestic hot water, ventilation and in-built lighting</i>	kWh/(m ² y)	On-site visit, manufacturer's information
(a)	Peak load <i>- displayed for each of the uses: space heating, space cooling, domestic hot water, ventilation and in-built lighting</i>	kW	On-site visit, manufacturer's information
(a)	Size of generator or system <i>- displayed for each of the uses: space heating, space cooling, domestic hot water, ventilation and in-built lighting</i>	kW	On-site visit, manufacturer's information
(a)	Main energy carrier and main type of element <i>- displayed for each of the uses: space heating, space cooling, domestic hot water, ventilation and in-built lighting</i>	Description	On-site visit, manufacturer's information
(b)	Greenhouse gas emission class <i>- if applicable</i>	e.g. from A to G	Only applicable if the Member State has introduced GHG emission classes
(c)	Information on carbon removals associated with the temporary storage of carbon in or on buildings	t CO _{2eq}	The CRCF Regulation ²³ can be used as a credible standard for declaring the carbon removal indicator on the EPC. It ensures that carbon removals are

²³ The [Carbon Removals and Carbon Farming \(CRCF\) Regulation](#) (EU/2024/3012); [Carbon Removals and Carbon Farming - European Commission](#).

			quantified and verified using established methodologies and third-party verification
(d)	Indication of whether a renovation passport is available for the building	Yes / No	Information from the building owner
(e)	Average U-value for the opaque elements of the building envelope	W/(mK)	On-site visit or through the energy performance calculation methodology
(f)	Average U-value for the transparent elements of the building envelope	W/(mK)	On-site visit or through the energy performance calculation methodology
(g)	Type of most common transparent element	e.g. single, double or triple glazing	On-site visit, manufacturer's information
(h)	Results of the analysis on overheating risk (if available)	Description	Link to Article 13
(i)	Presence of fixed sensors that monitor the indoor environmental quality	Yes / No	On-site visit, link to Article 13
(j)	Presence of fixed controls that respond to the levels of indoor environmental quality	Yes / No	On-site visit, link to Article 13
(k)	Recharging points for electric vehicles	Number and type	On-site visit, manufacturer's information, link to Article 14
(l)	Energy storage systems	Presence, type and size (in kWh)	Manufacturer's information, link to Article 13
(m)	Expected remaining lifespan of the heating or air-conditioning systems and appliances, where applicable	Years	On-site visit, manufacturer's information if available. Link to Article 13 and Article 19
(n)	Feasibility of adapting the heating system to operate at more efficient temperature settings	Description	Relation to Section 3.3 of this guidance, technical report, link to Article 13

(o)	Feasibility of adapting the domestic hot-water system to operate at more efficient temperature settings	Description	See Section 3.3 of this guidance, technical report. Link to Article 13
(p)	Feasibility of adapting the air-conditioning system to operate at more efficient temperature settings	Description	Link to Article 13
(q)	Metered energy consumption	kWh / MWh	To be metered as set out in Annex I, national calculation method
(r)	Whether there is a connection to a district heating and cooling network, and, if available, information about a potential connection to an efficient district heating and cooling system	Yes / No, plus further information	Local overview of district heating or cooling systems
(s)	Local primary energy factors and related carbon emission factors of the connected local district heating and cooling network	Numerical factor, e.g. 1	Local database on energy and carbon emission factors
(t)	Operational fine particulate matter (PM _{2.5}) emissions	µg/m ³ , µg/kWh or g of PM _{2.5} , which could inform an A to G rating	See Annex A7 of the report on increasing policy coherence between bioenergy and clean air policies and measures which provides a practical proposal on how to measure and assess buildings on the basis of their PM _{2.5} emissions

In addition to the indicators, information about links to other initiatives can be given, if these are relevant in the Member State.

	Indicator	Unit	How to / Source
(a)	A smart readiness assessment has been carried out for the building	Yes / No	Link to Article 15, Annex IV
(b)	Value of the smart readiness assessment	[-]	Link to Article 15, Annex IV
(c)	A digital logbook is available for the building	Yes / No	

8. IMPLEMENTATION OF OBLIGATIONS UNDER ANNEX VI

Member States must bring into force the laws, regulations and administrative provisions necessary to comply with Annex VI by the transposition deadline of 29 May 2026.

The third paragraph of Article 19(2) allows Member States that rescaled their energy performance classes between 1 January 2019 and 28 May 2024 to postpone the rescaling of the EPC classes. This derogation does not apply to the implementation of obligations related to the independent control system; therefore, the transposition deadline of 29 May 2026 cannot be postponed.

8.1. Definition of a valid EPC

Annex VI(1) requires Member States to set out a clear definition of what is considered a valid EPC in their EPC scheme.

The definition of a valid EPC must cover the elements listed in points (a) to (d) of Annex VI(1) of the EPBD. These points are described in Chapters 8.1.1 to 8.1.6.

Information relating to the definition of a valid EPC, including all the criteria and elements identified in Chapter 8.1 should be communicated and be made readily available to independent experts and all other relevant stakeholders. This information is also part of the obligation on public disclosure in Annex VI(5).

8.1.1. Validity of the calculations

This refers to the calculation methodology and the calculation itself used to produce an EPC. Although it is technically possible to produce an EPC by hand, in most cases independent experts rely on calculation tools. For an EPC to be valid, it must have been produced using a calculation tool which is in line with the calculation methodology specified by the relevant Member State.

Member States use a variety of approaches with regard to the calculation tools available in their territories. Some Member States produce an official tool whose use is mandatory. Other Member States instead make use of commercial tools that are certified to be in compliance with their calculation methodology. Some Member States use a mixed approach, issuing an official tool, but also allowing for the use of certified commercial tools. These different options have their advantages and disadvantages, but are all valid and Member States may choose the approach they believe is best suited.

Regardless of the approach used, Member States must ensure that valid EPCs have been produced using a calculation tool valid in their territory and that there has been no tampering with the calculation engine. Member States may do so, for example, by ensuring that calculation tools are protected from modifications or by carrying out individual checks.

8.1.2. Minimum number of elements differing from default or standard values

Member States must ensure that the definition of a valid EPC includes information on which variables must be filled in and with a value different from default or standard.

The calculation of EPCs and their input data may vary depending on the type of building. For example, EPCs for small existing buildings commonly require fewer elements or details than a large and complex new building. It may also depend on the complexity that the calculation allows for. EPCs across the EU vary quite significantly with regard to the number of elements

considered in the calculations, ranging between 30 and 750 variables. Most EPC schemes are in the range between 100 to 200 variables²⁴.

It is common that calculation software pre-fills in some of these variables with standard values, which are pre-defined, typical or common values. Default or standard values are used in most calculation methodologies and calculation tools. For example, the calculation software may already have a pre-filled in value for the transmission performance of the wall in new buildings. Another example is where a calculation engine pre-fills in information about the type and performance of a heating system. In the case of existing buildings, the standard value may be set up to reflect typical building construction characteristics.

In the case of calculation methodologies that use a reference building, these standard values should not be confused with the values provided for the reference or notional building. In this approach, the performance of the building is evaluated by comparing the actual building to a theoretical building (known as the ‘reference building’, hence the name of the approach) which shares the same geometrical characteristics of the building but uses a given set of performance characteristics (e.g. wall insulation).

To ensure that an EPC is representative of its building, the building model and its characteristics require a minimum level of detail. Otherwise, important information may be missing. Member States should therefore ensure that a minimum number of building characteristics or specific characteristics are used in a calculation. These minimum characteristics must be different from default or standard values.

This could include, for example, building type and use, location, climate, the physical characteristics of the building (e.g. size, geometry, U-values) and its systems (e.g. performance).

8.1.3. Validity checks on input data

This refers to the input data used in the calculation methodology. For an EPC to be valid, the input data used in an EPC must accurately represent the building, including its type, use, location, climate and characteristics (see Chapter 8.1.2). Otherwise, the model will not be representative, and the results of the assessments will be incorrect.

When carrying out the independent control of EPCs, Member States must verify that the input data reflects the building through a validity check.

The Commission recommends that the validity check is linked at least to those elements that are considered part of the minimum assessment (see chapter 8.1.2) or that are considered the most important contributors to the performance of a building (e.g. insulation values and performance of technical building systems).

Member States should specify how this validity check is to be carried out and what proof(s) will be deemed acceptable. For example, this could include provision of documentation (regarding plans, product specifications or certificates or on-site tests (e.g. blower door test)), random on-site checks, automated checks in calculation software or a mix of options.

Member States should communicate with experts about the validity check process and how their work on EPCs will be evaluated in this regard. This could be done through training, regular updates on expert databases, directly in the calculation software, etc.

²⁴ Source: CA EPBD (CT5) Certification and Training status report (2022) - [\(CT5\) Certification and Training – Status in 2022 - CA EPBD](#).

8.1.4. *Maximum deviation from the energy performance of a building*

The most visible and direct approach to evaluate if an EPC is valid or not is through the main indicator ($\text{kWh}/(\text{m}^2 \text{ y})$). For this evaluation, it is necessary to compare the EPC value as assessed by the expert and the EPC value independent control system. Because this value may change depending on the stage or who is assessing the EPC, it is important to clarify the terms used henceforth:

- “Assessor value”: this is the value provided by the Independent Expert that has produced the EPC
- “Control value”: this is the value provided by the Independent Control System
- “Recorded value”: this is the value as recorded in the EPC at any given time

Member States must set the maximum deviation of the “assessor value” from the “control value”. This assesses how far a given EPC can be from its control value before it cannot be considered a valid EPC any longer.

Article 19(1) requires that EPCs express the energy performance of a building by a numeric indicator of primary energy use in $\text{kWh}/(\text{m}^2/\text{y})$. Pursuant to Article 19(1), it is preferable for the maximum deviation of a building’s energy performance to be based on this indicator. Additional indicators may also be used.

There are multiple ways in which the maximum deviation of a building’s energy performance can be set. The EPBD allows Member States some flexibility on how to evaluate the maximum deviation of the energy performance (i.e. which indicator is used) and how precise the evaluation of the performance needs to be (i.e. the tolerance).

The most common options for setting the maximum deviation are described in the following paragraphs.

Maximum deviation based on fixed amount

This defines the maximum deviation as a fixed amount of the unit used to measure the energy performance. For example, in the case of primary energy use, the maximum deviation could be set at $\pm 10 \text{ kWh}/(\text{m}^2.\text{y})$.

This criterion is clear and easy to understand for independent experts and stakeholders. Depending on the range (tolerance) provided, it is particularly suitable for detailed calculations and when the characteristics of the building and its systems are well known. This is typically the case for new builds or major renovations, where the independent expert can rely on available and up-to-date plans or specifications and where it is easy to verify the details on site. However, if the range (tolerance) is limited it may be problematic for existing buildings, where the information is not available or it is difficult to check the construction details on site.

It is therefore very important to set the tolerance for the maximum deviation at the correct level. Member States could set different tolerance levels based on the type of building, its use or when an EPC is produced. Member States could set different levels of tolerance depending on these elements.

In the example of a Member State that sets up a deviation of $\pm 10 \text{ kWh}/(\text{m}^2.\text{y})$:

- An EPC where the assessor value is $85 \text{ kWh}/(\text{m}^2.\text{y})$ and the control value is $93 \text{ kWh}/(\text{m}^2.\text{y})$, would be valid.
- An EPC where the assessor value is $85 \text{ kWh}/(\text{m}^2.\text{y})$ and the control value is $100 \text{ kWh}/(\text{m}^2.\text{y})$ would be not-valid.

Maximum deviation based on a proportional value

This defines the maximum deviation as a proportion of a building's energy performance. For example, in the case of primary energy use, the maximum deviation could be set at $\pm 5\%$ of the energy performance of a building (in kWh/(m².y)).

This criterion is clear and easy to understand for independent experts and stakeholders. Since it is proportional, it provides flexibility for different levels of performance. Its use is well suited to existing poorly performing buildings or when there is limited information about the building. However, given that it is proportional to the value of the performance, it may become too strict when the value of a building approaches 0 (kWh/(m².y)). In this scenario the tolerance becomes very tight and small differences in the assessment could make an EPC invalid. Given that calculation methodologies have an embedded level of flexibility, it is important to ensure that the maximum deviation allows also for a degree of flexibility.

Member States could set different tolerance levels according to the level or type of EPC. It should be noted that, for buildings approaching energy performance close to 0, the range (tolerance) may need to be higher, which can be counterintuitive and difficult to communicate.

In the example of a Member State that sets up a deviation of $\pm 5\%$ of the energy performance (in kWh/(m².y)):

- An EPC where the assessor value is 96 kWh/(m².y) and the control value is 100 kWh/(m².y), would be valid.
- An EPC where the assessor value is 90 kWh/(m².y) and the control value is 100 kWh/(m².y) would be not-valid.

Maximum deviation based on whether a building is in the correct class (Y/N assessment)

This criterion only evaluates whether a building has been assigned the correct class. The differences in the value of the indicator (kWh/(m².y)) are not considered.

This criterion is very direct and easy to communicate and apply. It provides a sufficient level of information at the level of the EPC scheme (e.g. X% of EPCs correct/incorrect), although its value at individual EPC level is more limited.

However, it is subject to the energy classes and how these are defined. It can become very strict for buildings that have a performance close to the class limits.

Due to its limitations, the Commission does not recommend this approach.

Maximum deviation based on a mixed approach

As its name suggests, this approach relies on using at least two of the criteria previously described.

For example, the maximum deviation could be based on a fixed amount for buildings with good or very good performance (e.g. classes A, B and C) while using a proportional approach for worse performing classes (e.g. D, E, F and G).

The nature of the assessment of buildings performance may result in differences in the level of accuracy that can be achieved. For certain buildings (e.g. new buildings or major renovations), the independent expert may rely on readily available and detailed information, while for other buildings this information may be more difficult or costly to obtain. This limited access to information tends to be more prevalent in poor performing buildings.

Because it combines the benefits of the different approaches, a mixed approach is suitable to multiple situations. However, due to the use of a mix of criteria, it can be more prone to confusion. Nevertheless, given their qualifications or certifications, independent experts should be able to manage the different criteria. Member States that use this approach would need to ensure that the criteria are adequately communicated in order to avoid confusion.

8.1.5. *Additional elements*

In line with the last sentence of Annex VI(1), Member States may introduce additional elements into the valid EPC definition, such as boundaries for specific input data values or other specific requirements.

This could include, for example, maximum deviation values (i.e. tolerance) for the physical characteristics of a building and its systems.

When setting requirements, Member States may also consider the type of building, use and purpose of the EPC. This could include, for example: building typology, orientation, geometry, location, climate data and the performance of its building elements or systems.

Member States have some discretion in setting the boundaries of these values. They may adjust these boundaries, for example, depending on the building characteristics (e.g. its size), its typology (e.g. residential, office, school) or its state (e.g. new construction, renovated or existing). For example, quality criteria could be stricter for new buildings, where information and access to the building is easier.

Member States may also introduce requirements in terms of the information necessary for the processing of the EPC. This could include, for example, complete address, cadastre reference, on-site photographs, plans, etc. While these elements may not directly affect the calculation of the energy performance of the building, they are still relevant for administrative and quality purposes. Proper reference to the building (address or cadastre reference), for example, is important to ensure that the EPC is correctly attached to the building or to integrate with databases. On-site photographs or plans can confirm the presence of the independent expert (where relevant) or provide necessary information for the independent control system.

Member States may also apply validity requirements to the recommendations included in an EPC. These could include, for example:

- minimum number of recommendations;
- recommendations appropriate to the building;
- recommendations covering multiple building elements or technical building systems;
- recommendations covering a mix of short, medium and long-term measures.

8.1.6. *Validity and rating of an EPC following an assessment by the independent control system*

The purpose of the independent control system is to evaluate if an EPC is within the boundaries established by the definition of valid EPC. It is expected that there will be differences between the “assessor value” for an EPC and the “control value” determined by the independent control systems. This may create confusion as to which value is considered the correct one and which value is indicated in the EPC (the “recorded value”). Member States should specify what happens in these situations. The Commission recommends the following approach for different scenarios.

The EPC is produced by an expert and it is not evaluated by the independent control system.

In this scenario, the independent expert produces an EPC. The EPC may have gone through some automated checks or verification (e.g. to determine that it has fulfilled the minimum number of filled in values), but it has not been evaluated by the independent control system.

The “assessor value” is considered valid and it will become the “recorded value” in the EPC.

The EPC is produced by an expert and is evaluated by the independent control system as valid.

In this scenario, the independent expert produces an EPC, which then goes through verification and control procedures by the independent control system. This procedure identifies that the “assessor value” is valid.

The “assessor value” is considered valid and it is recommended that it becomes the “recorded value” in the EPC, even if there are differences between the “assessor value” and the “control value”.

The EPC is within boundaries and therefore there is no need to change it. This may be particularly relevant if the EPC rating has a bearing on the building’s legal status (e.g. for new buildings) or where it is linked to subsidies or financial schemes (e.g. when the EPC is used to demonstrate improvement). By keeping EPC rating EPC as originally assessed, the independent control system introduces no changes in any of these situations, therefore avoiding possible complications (e.g. recalculation of the value of a subsidy).

The EPC is produced by an expert and the independent control system identifies this as a non-valid EPC.

In this scenario, the independent expert produces an EPC, which then goes through the verification and control procedures by the independent control system. This procedure identifies that the “assessor value” is non-valid.

If the EPC is deemed non-valid, then the Commission recommends that the control value become the rating of the building or that the original EPC is considered void (i.e. the building does no longer have an EPC rating). This may, of course, have consequences for the building and the building owners, for example the need to look for a different expert to issue the EPC. It is recommended that Member States abide by the principle of proportionality and consider the consequences in different circumstances. For example:

- EPC for new buildings or buildings undergoing major renovation: if, following the independent control system, the building does not comply with the relevant legislation (e.g. ZEB or minimum energy performance requirements), the owner or developer of the building could be asked to rectify the situation and produce a new EPC afterwards;
- EPC for buildings that are receiving subsidies: Member States may use the control value to recalculate the effects on subsidies or ask for a repeat of the assessment following remedial works. Member States may apply similar rules for other subsidy schemes where the subsidy is proportional to a set of criteria.
- EPC for buildings that are being sold or renovated: if there are limited legal or economic consequences, Member States could make the recorded value equal to the control value. For example, if there are no minimum energy performance standards (obligation to renovate based on the EPC rating) or if the differences in the EPC rating do not represent a significant difference in the value of the building or subsequent running costs.

In all cases where the EPC is deemed non-valid, the owner or tenant of the building should be notified of the error, including the rating evaluated by the control system. This will allow them to carry out corrective measures, ask for any relevant compensation or simply be aware that the EPC may no longer be valid.

When considering the consequences of valid or invalid EPCs, Member States should also consider the level of responsibility of the independent expert and any legal consequences that they may face (see Chapter 8.3.5 Enforcement and penalties).

8.2. Analysis of the quality of the independent control system for EPC schemes

Annex VI(2) of the recast EPBD introduces a new requirement to ensure that at least 90% of EPCs are valid. It also introduces random sampling as the way to assess whether the overall EPC scheme complies with the 90% valid EPC criteria.. Finally, the EPBD requires Member States to regularly publish the results of the quality assessment. The objective of this approach is to ensure a high level of quality in EPC schemes while also providing information for the public and users, therefore supporting the perception of quality of EPCs.

The following sections describe the different steps of the process.

8.2.1. Definition of quality objectives in Member States

Annex VI(2) requires Member States to ensure at least 90% of EPCs are valid in their EPC schemes.

In their definition of quality objectives, Member States may go beyond this minimum level or include additional objectives. This could include elements that Member States consider relevant for quality purposes, but that are not strictly part of the definition of valid EPCs. For example, Member States could include quality objectives relating to the level of quality in recommendations (if these are not part of the definition of a valid EPC), number of complaints from users or number of available assessors proportional to the building stock.

In the relevant national implementing ('transposition') measures, Member States must clearly state the quality objectives applicable to their schemes.

8.2.2. Evaluation of the quality level through sampling

To ensure the quality of an EPC scheme, it is important to be able to assess the scheme as a whole. This would involve establishing if the scheme is reliable or not, and identifying how far from or close to the objectives the scheme is and what areas, if any, need improvement. However, evaluating 100% of the EPCs issued in an evaluation period would be very complex, costly and could delay the process for issuing an EPC. A typical approach in quality systems is to instead rely on samples, which must comply with a number of criteria.

This is why the recast EPBD requires Member States to evaluate the overall quality level in an EPC scheme (defined in Chapter 8.2.1) through random sampling. To ensure that the sampling is sufficiently representative of the EPCs that have been issued during the evaluation period, the recast EPBD also requires that the random sampling is carried out with a minimum 95% statistical confidence level.

The size of the random sample is determined by:

- the total number of EPCs issued for the evaluation period (usually a year). This will depend on the Member State and the level of EPC activity;
- the definition of a valid EPC. This will depend on the definition in force in the Member State and it mostly refers to the maximum deviation of the value of the indicator (primary energy in kWh/(m².y));

- the confidence level for the sample. This is set at 95% by Annex VI(2).

Evaluating the quality levels of an EPC scheme can be made very complex by the choice of elements to be considered for the sampling process and the nature of the assessment of performance in buildings.

As indicated above, multiple elements determine what constitutes a valid EPC. If all the elements were taken into consideration for the calculation of the sample size, this would result in a complex assessment and a disproportionately large sample size. The aim of the provision in the EPBD is to provide a straightforward assessment of the overall level of quality of the EPC scheme. For this reason, the Commission recommends that only the maximum deviation of the main indicator (primary energy in kWh/(m².y)) be taken into consideration. See Chapter 8.1.4 ‘Maximum deviation of the energy performance of a building’. This simplification ensures a sampling process that is proportionate to the objectives of quality assurance, without introducing an undue burden into the process. This simplification should not apply to the rest of the independent control system.

For example: a Member State uses multiple criteria to define the validity of an EPC, including maximum deviation for multiple indicators (e.g. total primary energy, GHG emissions, RES generation and individual U-values). To evaluate the quality level, Member States could consider just the main indicator (total primary energy) as the factor identifying if an EPC is valid or not. This would apply to both the calculation of the sample size and the obligation to ensure that 90% are valid. The remaining elements would still need to be taken into consideration for the purposes of the independent control system.

As indicated in Chapter 8.1.4, it is possible for Member States to use different criteria for the maximum deviation from the energy performance. To simplify the process of calculating the sample size, it is recommended that, for that purpose, Member States assume a constant maximum deviation equal to the one used for the better performing energy classes.

For example: a Member State uses a maximum deviation of ± 10 kWh(m².y) for classes A-C, a maximum deviation of ± 20 kWh(m².y) for classes D-E and a maximum deviation of ± 30 kWh(m².y) for classes F-G. In this scenario, the Member State could calculate the sample size assuming a constant maximum deviation of ± 10 kWh(m².y) throughout the whole scheme, basically assuming a worst-case scenario. This simplification only applies to the calculation of the sample size. The criteria for evaluating the validity of an individual EPC must remain the same.

The recast EPBD requires that the evaluation period of the EPC scheme must not exceed one year. Member States may decide on the start and end of the evaluation period, which must be clearly identified and communicated. Member States must select the random sample from the EPCs issued during the evaluation period.

Given the number of EPCs commonly issued and current quality levels (e.g. maximum deviation) available in Member States, the size for the sample will typically range from:

- 100 to 150 EPCs sampled for Member States with lower EPC numbers and milder quality criteria;
- 300-350 EPCs sampled for Member States with large EPC numbers and stricter quality criteria.

Even if a selection is made randomly, it is worth noting that it may not be fully representative. Some differences are to be fully expected, but the nature of random selection may result in some categories or types of EPCs being over-represented. If the sample is of sufficient size, this issue should be relatively minor, but it may still happen especially when

there are EPC types/categories which are much smaller than other types/categories or when the sample size is relatively small. To ensure that a sample is representative, following selection, Member States should check that the distribution of building categories, types of EPC (e.g. new build or existing) and ratings are within reasonable boundaries. If the sample is considered not representative Member States may:

- discard the first selection and re-select the full sample;
- discard EPCs from over-represented categories and introduce new EPCs from under-represented categories. The selection of the individual EPCs to be discarded or introduced should be random.

For example, a Member State forms a random sample of 300 buildings. In this sample, it is detected that hospital buildings are over-represented (45 buildings or 15% of the sample, when they only represent 5% of the total EPCs issued in the evaluation year). In this case, the Member State could choose to deselect 30 of the hospital buildings (chosen randomly) and select 30 new EPCs from other categories (chosen randomly from under-represented categories).

Most Member States evaluate the quality of EPCs on an ongoing basis. This means that the random sample may not be selected at a specific moment, but the selection will instead take place overtime. For Member States that evaluate on an ongoing basis, the Commission recommends that, during the overall evaluation period, the independent control system make an evaluation at multiple instances to verify that the random selection is approximately representative of the overall population. After each of these evaluations, the independent control system could adjust which categories random EPCs are selected from, if needed.

Member States may choose other methods provided they ensure a random selection that is representative of the overall number of EPCs issued in the evaluation period.

8.2.3. On-site visits for verifying input data

In many EPC schemes, the independent control systems check the validity of the input data against documentary evidence (e.g. plans or specifications). In some cases, this input data verification goes a step further by including an on-site visit to verify that the documentation provided reflects that actual building. This is because buildings undergo multiple changes and modifications during their lifetime, from the design stage, to construction, maintenance, renovation and normal use. The documentation available for a building may not always reflect these changes, so on-site verification is needed.

Annex VI(2) requires that, for on-site verification of input data, Member States select 10% of EPCs from the random sample taken for the quality evaluation of the EPC scheme (see Chapter 4.2.2). The selection of this 10% sub-sample should also be done randomly.

In most cases, on-site visits will require the authorisation of the building owner and/or tenant to access the building. Building owners and/or tenants may not want to give access to the building for a variety of reasons. Access to a building must always follow relevant national legislation, and any personal rights must be respected.

The fact that buildings must be selected randomly but building owners and/or tenants may not provide access may make it difficult to ensure a random selection. In this case, a best-effort approach is warranted. The Commission recommends that, if access to a building is denied, the EPC for that building is discarded from the sub-set of 10% of buildings that undergoes an on-site visit (it may still be part of the overall random sample). An EPC with a similar profile could be selected from the overall random sample to make up for it. For example: the owner of a residential building with a rating of E does not provide access to the independent control

system. In this case, the independent control system could choose another residential building with an E rating and request access to it.

While this approach may not ensure a fully randomised sample, it would still ensure a representative sample, which is the aim of the recast EPBD.

Member States could offer incentives to building owners and/or tenants that provide access to their buildings. For example, Member States could offer free energy advice, a building renovation passport, or monetary compensation. Member States can choose whether or not they offer compensation and, if they do, what type of compensation.

The verification of input data via on-site visits may be carried via virtual means where appropriate. In this case, the criteria for virtual means set out in section 3.2 would apply.

8.2.4. Delegation of EPC schemes and independent control systems

Article 27 allows Member States to delegate responsibilities for implementing the independent control system. Member States may decide how to apply the random sampling to measure the overall level of valid EPCs in the EPC scheme.

Member States may opt to evaluate a random sample and request EPCs from delegated bodies on the basis of total number of EPCs issued by each body.

Member States may also decide to delegate evaluation through random sampling. In this case there would be 2 options:

- (a) national authority fully delegates the evaluation of the quality level and assigns a quota of EPCs to be randomly checked by each delegated body;
- (b) national authority fully delegates the evaluation of the quality level and requires a separate random sampling (based on number of EPCs issued by delegated body and 95% confidence) to each delegated body.

To ensure quality levels and clarity of responsibility, the Commission recommends the use of option (b).

If independent control systems are delegated to non-governmental bodies, Annex V(2) requires that at least 25% of the random sample must be evaluated by a third party. This third party can be a governmental body (e.g. a national agency) or another non-governmental body. Member States could require that the third-party verification is carried out by a company certified to carry this type of assessment.

8.3. Quality management of EPC schemes

The evaluation tool described in Chapter 4.2. is a typical assessment tool applied in many quality systems. However, random sampling only measures if a quality level has been achieved. On its own, it is generally insufficient as a way of *maintaining* a satisfactory level of quality.

To ensure the required level of quality, an overall quality management approach is needed. The approach should look after the overall EPC scheme and the process for issuing issue EPCs. In Annex VI(2), the recast EPBD indicates that Member State must take pre-emptive and reactive measures to ensure the quality of the overall scheme. It allows Member States some flexibility in deciding which measures are most suitable.

In their approach to ensure the required level of quality, the Commission recommends that Member States take into consideration all the elements described in Chapters 8.3.1 to 8.3.6.

8.3.1. *Qualification and certification*

Independent experts must have the necessary expertise to evaluate the performance of buildings. This level of expertise can be demonstrated through either qualification or certification schemes.

Member States should consider the importance of this when designing qualifications and/or certification of independent experts, following the requirements set out in Article 25 of the EPBD.

8.3.2. *Training*

Training covers both initial training (e.g. if required for certification) and ongoing training throughout the years. It is one of the most important components of quality assurance, but unfortunately it seldom receives the necessary attention.

Training must cover all the aspects of the EPC issuing and validation process:

- calculation methodology (e.g. understanding of the performance of a building, its different elements, and how the assessment is carried out);
- assessment tools (e.g. training on the use of a specific calculation tool);
- assessment to produce an EPC (i.e. how to carry out an EPC assessment);
- conditions for the validity of an EPC (independent experts must understand how their work will be evaluated);
- administrative process – covering the non-technical aspects of issuing an EPC, such as documentation and uploading into the database;
- penalties/enforcement; independent experts must understand the consequences of issuing EPCs that are then evaluated as non-valid.

The Commission strongly recommends that independent experts are provided with updates to their training. Member States may decide if these updates could take place at regular intervals (e.g. every three years) or when the EPC scheme is amended. Member States may also decide if these updates become compulsory to maintain accreditation or are only voluntary.

8.3.3. *Embedded control and advice in calculation tools or EPB databases*

Independent experts may introduce errors during the evaluation process, especially given the number of variables to be considered. This can happen either by mistake or intentionally. A powerful technique for avoiding errors in the assessment is to embed control or advice in the issuing process itself, so that the independent expert receives a direct message. This can be done in the calculation tool or when the EPC is uploaded to the EPB database.

The advantage of this approach is that it works pre-emptively, helping the expert to avoid errors and facilitating the work of the independent control system. Usually, this approach results in a reduction of costs and administrative procedures. The Commission recommends its use where possible in the EPC issuing process.

For example, a calculation tool could generate messages for the independent expert indicating that one or more input/output values in the EPC are either incorrect or would need verification. Examples of messages could be:

- ‘Clash in geometric values (e.g. the surfaces of the different building elements do not add up to the total, more PV area than roof area)’;
- ‘Out of range values (e.g. the U-value of the building is excessively low/high)’;

- ‘Missing technical information (e.g. the heating system is missing information about insulation values, the U-value of the window frame has not been introduced)’;
- ‘Missing or erroneous administrative information (e.g. the address is incomplete the cadastre reference number is incorrect)’.

These messages could require the independent expert to make a correction or confirm the value. The error messages would ensure that the independent expert is aware that something may be amiss and confirm or correct it.

When combined with other sources of information, these support tools can be very specific. For example, the tool could detect that the U-value is very low for a specific building typology (e.g. buildings built in the 1960s). The expert could then confirm the value (if they have measured the insulation and are sure of the U-value) or make a correction.

The embedded control and advice should clearly differentiate between those values identified in both 8.1.2 and 8.1.3 and the rest of the values.

8.3.4. *Ongoing quality control and verification*

In addition to the random sample required by the recast EPBD, Member States could introduce additional quality controls. As indicated above, random sampling is a key component for the evaluation of the overall EPC scheme, but on its own it may be insufficient to ensure and maintain the required level of quality. For this reason, Member States may consider the introduction of additional quality control measures.

There are multiple measures for quality control and verification that Member States may use.

- Additional random samples. A larger sample base ensures that more EPCs are evaluated, which will increase the level of quality by reducing the number of invalid EPCs. This is a valid reactive measure, although it may not be as cost-effective as other measures²⁵.
- Targeted quality control. In this case, the EPCs are not selected on a random basis, but instead, the independent control system selects EPCs with criteria which make them more likely to be incorrect. For example, Member States could concentrate on EPCs that are very close to the rating threshold or EPCs that are abnormally high/low performing for a given building category. Member States could also concentrate efforts on specific independent experts. For example, Member States could run more checks on those experts who issue an abnormally high number of EPCs. Specifically targeting EPCs that are more likely to be invalid makes the controls more cost-effective. On the other hand, this method may decrease the likelihood of spotting new types of errors or and is prone to selection bias.
- Partial controls. These are similar to targeted quality control but applied to specific parts of EPCs which Member States may find relevant. For example, independent control systems could concentrate on the U-value of buildings because they have detected that this is the area where most errors occur.

Typical errors detected through random, targeted or partial controls are good candidates for embedded controls or advice. The results of the controls may also be used to develop or update training material.

²⁵ Random sampling is a key component of the overall assessment.

The introduction of one or more additional control measures (on top of the overall random sampling) makes experts more mindful of the multiple controls, which generally makes them more attentive to the assessment and less likely to make errors.

Member States may combine several of these measures and, because of their effectiveness, are strongly encouraged to do so.

8.3.5. Enforcement / penalties

In line with Article 34 (Penalties), Member States may introduce penalties for independent experts that fail to produce EPCs of sufficient quality, whether by error or intentionally. The application of penalties is a key part of ensuring a level playing field. Any penalties applied must be effective, proportionate and have a deterrent effect.

Member States have different options when applying penalties. They can:

- require re-issuing of the affected EPC;
- require re-issuing of a series of EPCs (if errors are suspected);
- require re-training or re-certification;
- impose a temporary ban (e.g. one-year ban on issuing EPCs);
- permanent loss of certification or qualification;
- monetary fines.

Member States should also consider the responsibilities of independent experts beyond enforcement and penalties. For example, in France the EPC can be legally challenged, which may result in economic compensation.

8.3.6. Total quality management

Single quality measures are unlikely to produce the required results. Targeted sampling on its own may be less cost-effective than training. Penalties without training would be unfair. And penalties without a strong detection mechanism are a weaker deterrent.

For this reason, it is recommended that Member States take a structured and organised approach to the independent control system.

Since its inception, the Concerted Action EPBD project (CA EPBD) has carried out extensive work analysing and discussing multiple quality approaches for EPC schemes. The Commission highly recommends consulting the CA EPBD's findings for the design of the independent control systems. These findings cover each of the elements described in Chapters 8.3.1 to 8.3.6.

There are also extensive quality management manuals and tools available, which Member States are encouraged to consider.

8.4. Independent control systems and EPB databases

Article 20(8) requires that all issued EPCs are uploaded into the databases for the energy performance of buildings. This includes the full EPC, with all its outputs and recommendations, and all the data (i.e. input data) needed to calculate the EPC. The independent control system requires this information to evaluate the validity of EPCs and the overall quality of the EPC scheme.

For quality and traceability purposes, Annex VI 2(8) requires that when a new or an existing EPC is amended or modified, the EPB database, national authorities (including the independent control system) are able to identify the expert that uploaded, amended or

modified the EPC. This should also apply to EPCs that have been amended through the simplified updating procedure.

To make EPB databases more compatible with other databases, it is strongly recommended that all databases use individual identifiers for the building or building unit. These identifiers could be linked to the cadastre, for example.

The use of interconnected databases can also be used for quality assurance purposes. For example, by having the EPB database connected to the national cadastre database, Member States could ensure that certain building information or data are cross-checked or even filled in pre-emptively (e.g. year of construction, building area).

8.5. Availability of EPCs

The EPBD recast requires Member States to ensure that the EPC is available to prospective building owners and tenants. A primary function of the EPC is to enable people to take a building's energy performance into account in their decision-making process when buying or renting a building. The point at which the EPC is made available is therefore very important. When checking for the availability of EPCs, Member States should check they are available at the right time. For example, it is common to check for an EPC when the deeds are exchanged in a sale or after a lease has been signed in case of a rental. However, this only guarantees that the EPC was provided at some point in the process, which may have been too late to have an effect on the decision process.

The EPBD requires that, when a building is offered for sale or rent, the EPC indicator and class is stated in advertisements. Annex VI specifically requires Member States to verify the visibility of the EPC. Having the EPC available in advertisements means that the prospective buyer or tenant will have access to the relevant EPC information from the start.

Due to the cost of verification, the Commission recommends focusing efforts on those areas where it is easier and more cost-effective to verify. For example, a Member State could concentrate on verifying the presence of EPC ratings in real-estate websites, news media or listings. Given the prevalence of websites as a way of looking for properties and the number of buildings usually found on these sites, this is a prime location for the use of automated verification mechanisms.

Member States may also use other tools like audits or inspection of advertising media, manual survey of real-estate locations or mystery shopping. These can provide effective alternatives when automated verification is not possible (e.g. in physical real-estate agencies) or to address specific identified gaps.

Article 19(3) requires Member States to ensure a common visual identity for EPCs. The Commission recommends that, together with this common visual identity in the EPC, Member States issue guidance, recommendations or obligations on the use of the EPC visual identity in advertisement media. The communication of a clear approach towards the use of a common visual identity would not only facilitate the use of automated verification mechanisms but would also provide clarity for advertisers and users, and avoid confusion.

8.6. Public disclosure of information on quality levels

Annex VI point 5 requires Member States to regularly publish information on the independent control system. The Commission recommends that this information be published following the evaluation period established in each Member State (e.g. at least yearly). The purpose of making this information available is to improve the perception of quality of EPCs. By providing up-to-date information on the evaluation process and its results, Member States can clarify some of the misconceptions about EPCs and their quality.

The EPBD requires at least the following information to be made available:

- definition of a valid EPC – this clarifies meaning of ‘valid EPC’ and what level of quality is expected for each EPC;
- quality objectives for the EPC scheme – this provides information about what the overall quality level of the scheme should be, including additional elements (see Chapter 4.1.5);
- results of the quality assessment – this provides information about the actual level of quality of the EPC scheme. The Commission recommends that Member States include the following elements:
 - results of the random sample verification process (i.e. % of valid EPCs);
 - summary description of all quality measures employed;
 - summary of the results of the different quality tools used (e.g. % of valid EPCs in targeted sampling), including changes compared to previous years;
- contingency measures to improve the overall quality level of EPCs.

The information above may be published in different formats (e.g. report or updated webpage alongside the EPB database).

8.6.1. Differences between the calculated/estimated and measured energy performance

The differences between the calculated/estimated (asset rating) and measured energy consumption have been identified by Member States as a source of misunderstanding which affects the perception of the EPC system²⁶.

As an information tool, EPCs should enable comparisons between different buildings. Almost invariably, this requires an asset rating approach based on standardised values for multiple building characteristics and parameters, particularly those related to the building use, e.g. values relating to the number of occupants, occupancy patterns, and intensity of consumption for non-EPB uses. This is a similar approach to those used to compare different products (e.g. consumer products, motors or cars).

A common misconception about EPCs is that they must replicate exactly the actual energy consumption of any given building. This has given rise to the so-called ‘performance gap’ between the energy consumption indicated in EPCs and the measured consumption. In practice, the performance gap may be due to a number of reasons (in no particular order):

- influence of user behaviour (expected differences);
- errors in the EPC calculation;
- improper installation of building elements or systems (e.g. windows not adequately draft-proofed, missing insulation, systems not properly commissioned);
- systems not operating properly (e.g. boiler not working in condensing mode, heat pump working at higher temperatures);
- deterioration or faults in systems (e.g. boiler broken down, ventilation operating at reduced levels).

The Commission recommends that Member States address the misconceptions about the differences between the calculated/estimated (asset rating) and measured energy consumption in its public information on quality levels and in general communication on EPCs.

²⁶ [CA-EPBD-CT3-Certification_Control-system_Quality-2018.pdf](#) (Section 3.2.2).

Specifically, they should provide information and explanations on the characteristics of the EPC and how relevant differences may be detected and resolved. It is important that users understand the purpose of the EPC and are empowered to act accordingly.

For this, Member States could use one or more of the following options:

- publish information on the principles of asset rating, how it works and what type of differences could be expected (e.g. typical ranges for deviation in certain buildings);
- provide access to independent experts, one-stop shops or any other service that may provide energy advice;
- provide a way for building owners or tenants to object to or enquire about the results of an EPC;
- provide users with information on how to evaluate if any observed differences in performance are due to the use of the building. For example: a by 1 °C increase in heating temperature translates into a 5-10% increase in energy consumption; an increase in the number of occupants increases consumption by x%. Conversely, not switching on the heating until November reduces consumption by x%. This type of information may also be used to raise occupants' awareness of the importance of user behaviour in building performance;
- introduce EPC tools that allow building users to modify certain parameters in an EPC and observe the differences;
- provide checklists of elements or systems to be checked in a building.

Member States may also use other relevant communication tools related to EPCs like websites, FAQ sections, EPB databases, manuals, information material and the EPC itself.