EPBD Compared to the REHVA Principles for 2050 Ready Buildings

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Introduction

The 4th EPBD, was formally adopted in April 2024. Previous editions have been issued in 2002, 2010 and 2018.

HVAC professionals are impacted by the recast EPBD in their daily work, for example by the energy performance calculation methodology, the indicators and requirements. In this document, several EPBD articles related to the energy performance are compared to REHVA principles for 2050 ready buildings.

The implementation period will be crucial for practical application at national level. REHVA, together with its Member Association, will be active to bring in their technical competence and experience.

1) Recall of REHVA principles – the 2050 ready buildings

REHVA, and its national Member association, contribute to the development of an economical, sustainable, safe and healthy built environment. REHVA encourage political and administrative decision takers to endorse the technical principles proposed by the HVAC experts to reach the 2050's EU targets in the building sector.

REHVA stands for:

- Technology neutral approach;
- Holistic decarbonised design of buildings, interacting with energy distribution networks, based on
  - the Energy Efficiency First principle,
  - the priority use of renewables in the entire energy chain,
  - a life cycle approach;
- High indoor environmental quality (IEQ) and indoor air quality (IAQ);
- Social responsibility, by designing optimised, cost effective and affordable buildings;
- Performance based building codes focusing on the results and not on the means;
- European coordination, a European common technical language allowing harmonised upskilling of professionals and free circulation of professionals and services.

There is no "one fits all solution" but a needed optimisation of the solutions adapted to each building, worked out by qualified professional.

2) EPBD provisions

2.1 Article 3: National building renovation plan

Article 3 states that each Member State shall establish a national building renovation plan to ensure the renovation of the national stock of residential and non-residential buildings into a highly energy-efficient and decarbonised building stock by 2050, with the objective to transform existing buildings into zero-emission buildings.

Directly related to Article 3, in Annex II, there is a revised template for the national building renovation plans, with a set of mandatory and optional indicators. Among the mandatory indicators, there is an obligation to include policies and measures, with a view to a complete phase-out of fossil fuel boilers by 2040.

A "fossil fuel boiler" is not defined in the EPBD. Does a "fossil fuel boiler" use 100% of fossil fuels, more than 50% of fossil, or less? Why focussing on a technology, the boiler, and not targeting "heat generators"? The Commission services committed to define "fossil fuel boilers".

The "phase out of fossil fuel boiler" targets a technology. It is therefore not in line with a technology neutral approach. The requirement should be performance based, asking for CO_2 neutrality in 2050. This would provide flexibility to the HVAC professionals allowing them to find the optimised, affordable solution for each building.

The definition of fossil fuel boilers, should be related to an annual use of fossil fuels allowing compensation.

2.2 Article 4: Adoption of a methodology for calculating the energy performance of buildings

Article 4 states that the Commission shall issue guidance for the calculation of the energy performance of transparent building elements that form part of the building envelope and the consideration of ambient energy.

A common general framework for the calculation of the energy performance of buildings referring to Article 4, is set in Annex 1. It is a framework, not defining how to take into account the calculation details, for example, exported energy, where to set the assessment boundary, how to consider ambient heat in the total primary energy, which time step to use (monthly, hourly), etc.

Today, more than 30 calculation methods, providing all different results, are used in the EU. They are of different quality. There is no comparability. The same building can be nZEB with one calculation method and a worse building with another method.

The calculation methodologies are key for the reliability of the energy performance assessment, comparable results, a fair comparison of the technical systems (level playing field). They are the basis for the setting of requirements (building codes, ZEB definition, the cost optimum calculation, etc).

Therefore, there is need for **EU wide common** calculation methodology and definitions. All Member States (MS) must update their national methods to consider the new EPBD requirements. This update requires an important funding and competence.

The Commission should help to develop an open-source EU kernel (software tool), based on CEN standards, and providing the needed flexibility for national transposition.

There is no obligation for the Member States to overtake the kernel. The kernel is a support for the application of the revised EPBD, rather than a regulatory transposition. This justifies also the European funding.

2.3 Article 9: Minimum energy performance standards (MEPS) for non-residential buildings and trajectories for progressive renovation of the residential building stock

Article 9 states that Member States shall establish MEPS which ensure that non-residential buildings do not exceed the specified maximum energy performance threshold, expressed by a numeric indicator of primary or final energy use in kWh/(m².y) *.

The minimum energy performance standards shall ensure that all non-residential buildings are below:

(a) the 16% threshold from 2030,

(b) the 26% threshold from 2033.

Article 9 (2), on the trajectories for progressive renovation of the residential sector, requires Member States to establish a national trajectory that leads to reducing the average primary energy use of the residential building stock by 16% by 2030 and by a range of 20-22% by 2035.

The intention of this article is the renovation the 16% worst-performing buildings by 2030 and the 26% worst-performing buildings by 2033.

"Final" energy is not defined in the EPBD. This term is not used in the related EN ISO standards (the EN ISO 52000 series). The definition proposed by the EU parliament (EU 9a) or in the EED (6) does not fit for the purpose of the EPBD, because e.g. gas is not "ready for consumption". The definition in the EED (EED 6) excludes ambient heat, but not PV, whereas the EPBD considers on-site or nearby produced renewable energy.

"Final energy" also does not take into account the generation and distribution losses and performance of heating systems when the generation is located outside the building (e.g. district heating, direct electrical heating devices).

Choosing "final energy" as indicator for MEPS is not in line with a holistic decarbonised design of heating and cooling systems. It does not create a fair comparison (level playing field) between technical systems.

Therefore, Member States should choose the primary energy indicator for the MEPS.

2.4 Article 11 Zero-emission building (ZEB)

This definition is the further development of the nZEB (nearly Zero Energy Building) definition. It is extremely important because all buildings in the EU must be zero-emission building by 2050. Class A of an

* EPBD doesn't define final energy use, according Eurostat it is: "Final energy consumption is the total energy consumed by end users, such as households, industry and agriculture. It is the energy which reaches the final consumer's door and excludes that which is used by the energy sector itself". In 2023 the EU-wide Primary Energy use was around 1.29 times the Final Energy value.

EPC (Energy Performance Certificate) shall be associated to zero emission buildings.

As it is the case for nZEBs, a zero-emission building is defined in terms of energy demand (use), as

- a building with a very high energy performance, in accordance with Annex I;
- requiring zero or a very low amount of energy".

It is a national responsibility to set thresholds for the maximum ZEB energy demand (use) **.

In addition, the Directive states that a ZEB:

- shall not cause any on-site carbon emissions from fossil fuels;
- should produce zero or a very low amount of operational GHG emissions.

In terms of energy sources that are eligible to supply a ZEB, it is stated that the total annual primary energy use must be covered by:

- On-site or nearby renewable energy sources;
- Renewable energy from a renewable energy community;
- Energy from an efficient district heating and cooling (DHC) system;
- Energy from "carbon free sources".

Where it is not technically or economically feasible to use the above options, the total annual primary energy use may also be covered by other energy from the grid complying with criteria established at national level.

While the first two options clearly point towards renewable energy exclusively, the other two options and the alternative, do not ensure that a ZEB will use only renewables.

It is understood that "**annual**" means that:

- the different options of the energy sources may be summed up to reach 100% of renewable or carbon free total primary energy use. Therefore, for example, on-site heat pumps will only reach 100% of renewable primary energy, if they are driven by 100% green electricity.
- it is permitted that energies with a carbon content can be used, if the carbon emissions and the non-renewable part are compensated, on an annual basis, by exported renewables.

The annual approach allowing compensation while maintaining the target of CO_2 neutrality in 2050 provides flexibility. This flexibility allows to optimise the technical solutions and reduce the costs for the building owner.

Therefore, it should be specified in the guidelines and national transpositions that "any on-site carbon emissions" are taken on an annual basis as stated in article 11.7.

Article 11 mention also "dedicated connections". The compensation mentioned before could be considered as a "trading" compensation. Therefore, the dedicated connections should not only be on a "physical" distribution. Contractual agreements should be considered as dedicated connections.

The annual compensation should be done on an hourly basis, with hourly CO_2 emission factors, because it is questionable if a yearly compensation assessed on monthly basis makes sense. At hours where there is an overproduction of renewables on site (like from PV), the grid may not always be able to process this and the assumed compensation is not realised.

2.5 Other provisions

The EPBD pays special attention to the social fairness of all provisions. Recognition is given to the social aspects of building decarbonisation policies, with the introduction of legal definitions for specific concepts such as 'energy poverty' and 'vulnerable households'.

More attention is given to the Indoor environmental quality aspects, but only in a very general way. The details have to be specified in the national transpositions.

The lifecycle thinking is introduced in the EPBD. By 31/12/2025 the Commission must adopt a Delegated Act to amend Annex III to set up a Union framework for the national calculation of lifecycle global warming potential. ■

** It is confusing that the EPBD uses the terminology "energy demand" and "energy use", they are considered to be synonyms; energy use is defined in art 2 (58): 'energy use' or 'energy consumption' means energy input to a technical building system providing an EPB service to satisfy an energy need.