



Making building performance assessment transparent & holistic: ensuring a reliable and level playing field



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1. Introduction

The aim of these policy recommendations is to facilitate & support a transparent and holistic approach in EPBD's transposition, implementation and monitoring at Member State level with regards to building performance assessment methods.

The invisible needs to be made visible: make salient the importance of choices opted for in the national building performance assessment methods and their prerequisite role and high impact in completely decarbonizing in practice the EU's building stock by 2050, while simultaneously contributing to strengthen EU's energy security.

A transparent, holistic and technology neutral approach is instrumental be it for building performance certification, minimum energy performance standards, minimum energy performance requirements, cost-optimality or financing purposes. This would ensure a level playing field and avoid the greenwashing of the private and public capital to be mobilized for the building sector (e.g. Renovation Wave) in the coming years and decades.

With the current EPBD revision (almost) everything must be done right from the very beginning while avoiding lock-in effects, because a second chance is highly likely not available at the current pace of climate change developments.

Building performance assessment methods need to be recognized as the lynchpin for the transition to an overarching digitally transformed EU building stock as means for healthy, safe, affordable, efficient, flexible and zero emission buildings.

Reaching a common language on this topic is paramount and would underpin an effective EPBD. Clear definitions and provisions are urgently needed otherwise there can't be a fruitful discussion.

2. A non-renewable primary energy indicator instead of total primary energy indicator is more technology-neutral

A key amendment proposed by U-CERT project is the replacement of total primary energy use by non-renewable primary energy use which is a fundamental issue for the proper calculation of building performance, including that of zero-emission buildings.

The total primary energy indicator does not allow for a meaningful calculation of the energy use, as it does not distinguish between the renewable and non-renewable energy, and it includes heat extracted from ambient. For example, when comparing the energy performance of gas boilers with heat pumps, the gas boilers have a lower total primary energy use due to this inclusion.

This point is demonstrated in the [EPBD primary energy calculator](#) prepared by REHVA experts, involved in U-CERT project, of which you can see the result in the table below.

	Energy calculation	Energy need kWh/m ² a	Energy use kWh/m ² a			
			DH	Gas	GSHP	AWHP
	space heating	25.9	29.7	28.1	10.8	12.8
	DHW	30	33.3	31.6	11.5	15.0
	supply air heating	4.4	4.4	4.4	4.4	4.4
	fans and pumps	5.5	6	6	5.5	5.5
	fixed lighting	1.4	1.4	1.4	1.4	1.4
	PV generation	16				
	PV self use, -		0.55	0.55	0.7	0.7
	PV self use, kWh/m ² a		8.8	8.8	11.2	11.2
	PV export ¹ , 0/1	0	0	0	0	0
→	Non-ren. primary energy, kWh/m ² a		44.7	72.6	51.7	64.2
	Total primary energy², kWh/m² a		91.9	82.0	100.9	109.0
	Renewable energy³, kWh/m² a		53.8	16.0	49.5	44.1
→	CO ₂ emissions, kgCO ₂ /m ² a		8.8	14.4	9.4	11.7

Figure 1 Results from EPBD Primary Energy Calculator - illustrating the difficulty for heat pump-based systems to meet the thresholds in Annex III of the EPBD Recast as proposed by the European Commission (DH=District Heating; Gas=Gas boiler; GSHP=Ground Sourced Heat Pump; AWHP=Air-to-Water Heat Pump)

U-CERT project proposes to use non-renewable primary energy as an indicator instead and update the maximum thresholds (Annex III of the EPBD Recast as proposed by the European Commission) accordingly, so that when there is a very low amount of non-renewable energy required in ZEBs, the CO₂ is compensated by renewable energy generated on-site, from a renewable energy community (described in Directive (EU) 2018/2001), district heating and cooling systems, or from the grid. This makes the calculation of ZEBs more transparent and doesn't disadvantage certain technologies, most notably in this example heat pumps.

- Interested in reading more about this point?
 - Read the article in REHVA Journal by Jarek Kurnitski & Johann Zirngibl: [Technical comments on the zero-emission building definition in EPBD recast proposal](#)
 - Read the article in REHVA Journal by Jarek Kurnitski and Dick van Dijk: [How to come to a transparent and fair ZEB definition?](#)

3. An hourly calculation time step of the energy balance is more transparent than annual calculation time step

Currently the EPBD allows for the balance between renewable & non-renewable energy in a building to be calculated on a “net annual basis”. However, this calculation of the balance on an annual basis allows to cover up the amount of non-renewable energy that has been used in a building and it does not incentivize to use the smart design of a building where supply and demand are matched, which is what a zero-emission building should aim at.

This can be best explained by looking at photovoltaic (PV) solar that is generated on-site at a building. On many days, especially in winter, there’s not enough PV generation to cover the energy needs and the building will need electricity from the grid, which causes additional CO₂ emissions (until the grid is fully decarbonised but this may still take a while). On sunny days however, the PV generation will create surplus of renewable energy which is put back on the grid. This means that when we look at this balance at an annual basis, the renewable energy put on the grid compensates for the non-renewable energy that is used from the grid. Meaning that the non-renewable energy use is covered up.

If the desire is to limit the real amount of fossil energy used in zero-emission buildings, then the balance needs to be looked at on an hourly basis. This way surplus renewable energy generated in summer, cannot compensate for the non-renewable energy used in winter.

- Interested in reading more about this point?
 - Read the article in EHVA Journal by Jarek Kurnitski & Jaap Hogeling: [How to set primary energy requirements so that poor building envelope cannot be compensated with extensive PV?](#)

4. The need for an EU-wide software kernel to take the next step towards a harmonised energy performance calculation methodology

Indicators will always be needed to be calculated in the EPBD. Therefore, the main indicator should be changed from total to no-renewable primary energy because the target is to phase out fossil fuels and to support renewables. This target cannot be reached with a total primary energy indicator which does not distinguish between fossil fuels and renewables. Changing the indicator from total primary to non-renewable primary energy should only be a first step. The important recommendation is that for an effective EPBD implementation a common EU calculation method and the related tool at EU level are needed. The principle of subsidiarity for the Member States should not be in the methods (this is technical, physical) but in the requirement levels (this is political).

The setting of maximum threshold values within the ZEB requirements creates a need for more detailed technical definitions to ensure that the requirements would be understood and implemented in a similar fashion in MSs. U-CERT project firmly considers this EPBD Recast as a make-or-break moment to move towards a common European performance calculation methodology and requirements in line with the set of EPB standards developed under the European Commission to CEN Mandate 480, otherwise we will fail to deliver on the European climate and energy goals in the building sector. U-CERT project proposes to include a mandate for DG ENER in Article 4 to develop a delegated act about a common European calculation methodology of energy performance indicators (similarly to what was previously done for the cost-optimal methodology) to support Annex I with a more in-depth elaboration of technical details in this calculation.

To facilitate this common calculation methodology U-CERT project supports the promotion and development of an open-source software kernel meeting the requirements of article 4 and Annex I, as well as dynamic energy simulation software tools to promote the harmonised application of the set of EPB standards and the harmonisation of national building performance calculation methodologies. Hourly and dynamic simulation tools represent an important development step in energy calculations and are also suitable for flexibility, grid load and demand response analyses.

Lastly, there should be a quality check of the calculation methods (as it is done for example on the minimum requirements). European standards should be the reference for this quality check. Overall, it is largely agreed that the assessment methods must reach a higher level of quality.

- Interested in reading more about this point?
 - Read the annexed U-CERT project experts' opinion on an EU-wide software kernel

5. Buildings are built for the people – Indoor Environmental Quality (IEQ) should be on an equal footing with energy and emissions

U-CERT project supports the addition proposed by rapporteur Ciaran Cuffe in [amendment 1038](#) for Member States to set minimum requirements on Indoor Environmental Quality based on a delegated act by the Commission and linking it to indicators in the Level(s) framework. Some minor comments on this amendment is that “L/s per person” and “L/s per m²” may be a more appropriate way to express the ventilation rate instead of “air changes per hour”.

The requirements to be developed in such a delegated act could be made even more clear and in depth if they use categories I – IV in the EPB standard EN 16798-1 as the basis for different types of buildings.

This also is true for [amendment 1032](#) as proposed by Morten Petersen.

- Interested in reading more about this point?
 - Read the article in REHVA Journal by Wenjuan Wei, Pawel Wargocki and Corinne Mandin: [TAIL and PredicTAIL – the tools for rating and predicting the indoor environmental quality in buildings](#)

6. Several concrete amendments in EPBD Recast linked to the previous points

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

Rational: European standards are the common, technical language of the European industry. Building professionals also need a common language to reach a level playing field of quality, to develop common training and qualification of experts. The European Commission financed the development of European standards (Mandate 480) facilitating the implementation of the EPBD at national level. They should be used now. Therefore, the EPBD Recast should be amended as follows:

- Member States shall apply a methodology for calculating the energy performance of buildings in accordance with the common general framework set out in Annex I, → based on European standards or equivalent ←

ANNEX I COMMON GENERAL FRAMEWORK FOR THE CALCULATION OF ENERGY PERFORMANCE OF BUILDINGS (referred to in Article 4)

Rational: Using hourly time calculation intervals should be kept in ANNEX 1 because only hourly calculations are able to consider correctly varying conditions that significantly affect the performance of the system, the indoor conditions, and to optimise health and indoor environmental quality. Most of the national methods need to be upgraded. In addition, building professionals needs high quality software tools to be able to assess correctly high-performance buildings. The tools cannot be developed by the market in all Member States because the market is too small. An European open source calculation software tool, which then will be completed by national user interfaces, is needed. Therefore, the EPBD Recast should be amended as follows:

- End of ANNEX I: → The Commission shall develop an open-source kernel (software tool) for high-quality building performance assessment in accordance with Annex I. The software tool's methodology shall be based on the European standards. This common European calculation kernel shall also be used to evaluate equivalent national calculation tools ←

Article 5 Setting of minimum energy performance requirements

Rational: A healthy and comfortable indoor climate is requested in article 5. But there is no clear definition nor indicator. To be able to communicate the quality of the indoor environment to the owners or occupants a common indicator should be defined, as it was done for the Smart Readiness Indicator (SRI). Therefore, the EPBD recast should be amended as follows:

- ... the designated function and the age of the building. → The Commission is empowered to adopt delegated acts in accordance with Article 23 supplementing this Directive for an 'indoor environment quality (IEQ) indicator' and with the conditions this indicator would be provided as additional information to new tenants or buyers ←



U-CERT

User-Centred Energy Performance
Assessment and Certification

OUR TEAM



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