



EPBD recast guidance documents

– implications on energy performance calculations of the total primary energy approach

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A package of guidance documents and regulations was published on 30 June 2025 by the Commission to support the implementation of EPBD recast EU/2024/1275. This article analyses some of them with the focus on the total primary energy approach requested by EPBD recast for the energy performance calculations. Clarifications and proposals for improving the calculation methodology are provided as well.

Introduction

A package of documents published by the Commission on 30 June 2025 as a support to Member States for the implementation of EPBD recast EU/2024/1275 [1] comprises:

- *Delegated Regulation revising the methodological framework for calculating cost-optimal levels,*
- *Implementing Regulation establishing common templates for the transfer of information from national databases to the EU Building Stock Observatory,*
- the set of 13 guidance documents related to the particular Articles and Annexes of the EPBD recast [1].

This paper focuses on the following delegated regulation and guidance documents:

- Delegated Regulation revising the methodological framework for calculating cost-optimal levels and its Annexes [2],
- Guidelines accompanying Commission Delegated Regulation (EU) .../... to facilitate the application of the revised methodology framework for calculating cost-optimal levels [3],
- Common general framework for the calculation of the energy performance of buildings (Annex I) guideline [4],
- Energy performance certificates (Articles 19-21, Annex V) and independent control systems (Annex VI) guideline [6].

The guidance documents attempt to answer the questions raised by the Member States (MSs) and provide interpretations of the new EPBD recast [1] provisions via definitions, descriptions and examples. The overwhelming part of these interpretations is given in the form of recommendations allowing MSs to make adjustments to their calculation methodologies.

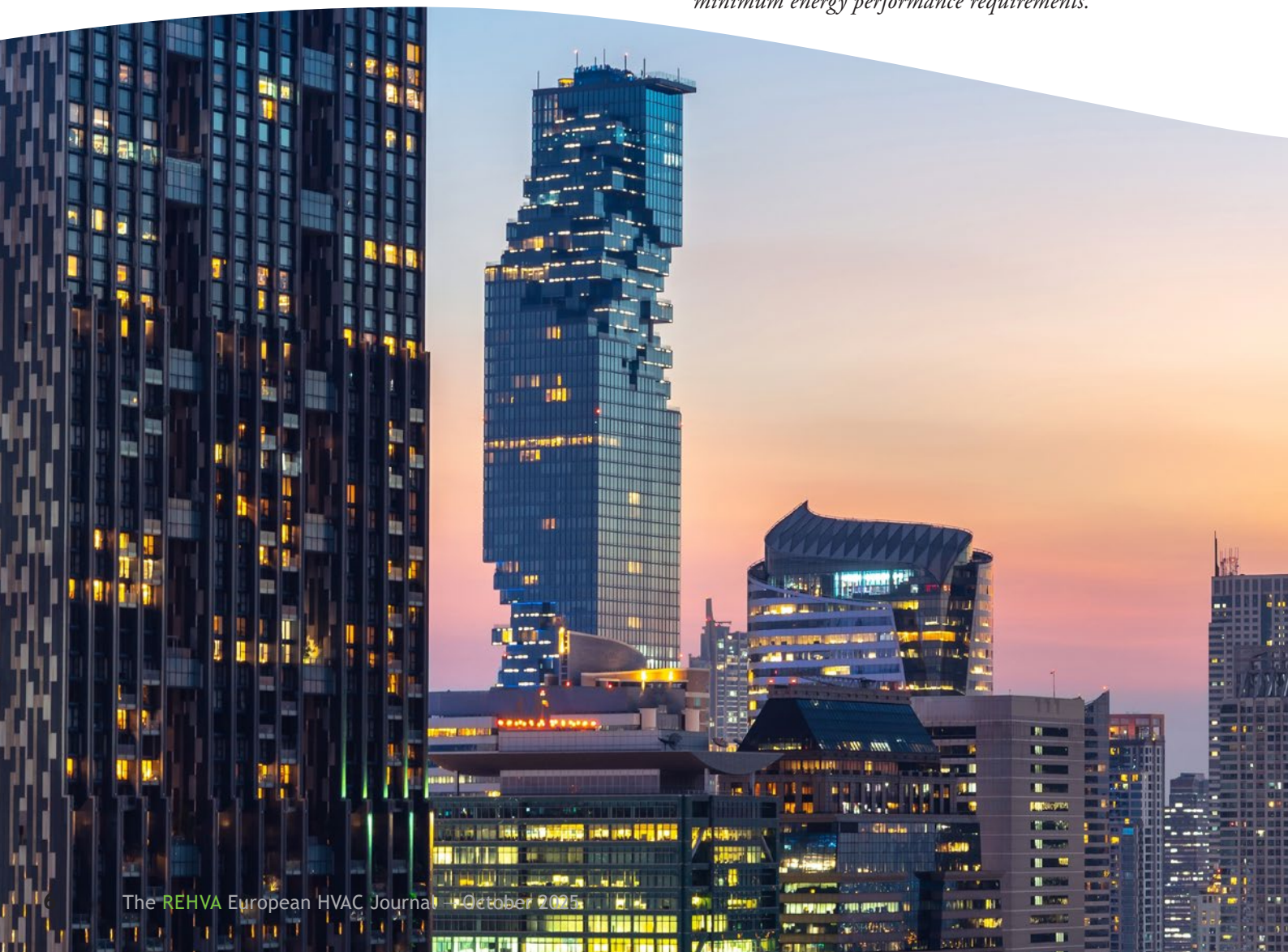
However, there is a need for further clarifications of the provided interpretations and their implications on the present calculation methodologies and cost-optimal levels of minimum energy performance requirements.

Obligation to use total primary energy

In EPBD recast [1] the **total primary factor** is defined as “*the sum of renewable and non-renewable primary energy factors for a given energy carrier* “. Total primary energy is not defined.

- **EPBD recast** requests in **art. 11(3)** that the maximum threshold for Zero Emission Buildings (ZEB) shall be expressed in **total** primary energy.
- **Guideline [4] in art. 4.2** interprets primary energy from EPBD Annex I Paragraph 4 as total primary energy :

‘Paragraph 1(4) of Annex 1 EPBD recast requires that the energy performance is expressed by a numeric indicator of (total) primary energy use per unit of reference floor area (kWh/(m² y)) for the purposes of energy performance certification and compliance with minimum energy performance requirements.’



It should be noticed that in EPBD recast [1] only primary energy is mentioned and that the term “total” has been added in the guidelines.

In art 4.2 [4], dealing with Indicators of energy performance, it is also stated that:

Member States must also define additional indicators for (paragraph 3):

total non-renewable primary energy (kWh/m² y);
total renewable primary energy use (kWh/m² y)

The terms of “total”, “non-renewable”, “renewable” are mixed up and contradictory to the definition of the total primary energy factor.

- The **Delegated Regulation** [2] clearly states that total primary energy shall be used for cost-optimal calculations:

Total primary energy (kWh/m²y), detailed in both its renewable and non-renewable shares, is the reference metric to be used by Member States for the cost-optimal calculation.’

In the **EPC guideline** [6], **primary energy** is interpreted as **total primary energy** (e.g. in the text describing need for rescaling of energy

certificates due to present use of total primary energy instead of non-renewable energy in old certificates. However, there is no explicit use of the term **total primary energy** in corresponding tables overtaken from the EPBD recast [1] where only **primary energy** is mentioned. Also, the term **energy demand threshold** is not used (like in ZEB guideline [5]) but the term **primary energy threshold** instead.

Formally, use of **total primary energy** is explicitly stipulated for determining cost optimum levels (by the Delegated Regulation [2]) and for related compliance check of ZEB threshold (by the EPBD recast [1]).

To conclude, there is a **clear intention of the EU commission** to use the total primary energy as a main energy performance metric for all EPBD purposes. The main argument for the use of total primary energy, instead of, for example, the non-renewable primary energy, which is used in many Member States, was that also renewable energies should not be wasted.

But with this approach, **renewable energy will not be valorized** in the building energy performance assessment. There would be no difference between the use of renewables and fossil fuels, which is contradictory to the European target favorizing the use of renewables.



Total primary energy calculations of renewables

The **Delegated Regulation** and its Annex [2] define the treatment of renewable energy **produced on-site** in cost optimal calculations for the total primary approach:

‘Renewable energy produced and self-used on site for EPB services shall not be accounted in the total primary energy use. Renewable energy produced on site and used on site for non-EPB uses or exported to the grid may be deducted from the primary energy use’.

This approach, introducing the perimeters “on-site”, “nearby”, “distant” in the building energy performance, was already used in the definition on nZEB buildings. It is in line with the approach of the EN ISO standards 52000-1 [7].

The **General framework guideline** [4] proposes two approaches for calculation of primary energy produced and **used on-site** (without distinguishing from EPB and non-EPB uses):

- The **PEF for on-site RES is given a value of 0**,
- The PEF for on-site RES is given a value of **1**. In the calculation of total primary energy, the PEF is combined with a factor (e.g. ‘ k_{exp} ’) of value equal to **0**:
 $k_{exp} = 0$, therefore $PEF * k_{exp} = 0$.

The approach a) uses non-physical values of total $PEF_{tot}=0$ (for renewable energy $PEF_{tot}=1$, see EN ISO 52000-1 [7]). Although both approaches yield the same result, the Commission recommends approach b) as ‘it better represents nature of energy flows’ and ‘is in line with EN ISO 52000-1’. But it should be noted that in EN ISO 52000-1 [7] k_{exp} is applied only to exported renewable energy.

In the **ZEB guideline** [5], the same approach with multiplier factor is used in given examples, only a symbol M_{prim} is used instead of k_{exp} , and is applied also to exported renewable energy.

The use of $M_{prim}(k_{exp})$ multiplier factor is only needed when the assessment boundary is set at building itself (**Figure 1**). This is the preferred choice, because it brings energy use and delivered energy into an energy balance.

In the **ZEB guideline** [5], calculation examples for additional assessment boundary set on the on-site perimeter are provided. In this case, the on-site produced renewable energy is not counted as the delivered one, provided its origin is within the assessment boundary.

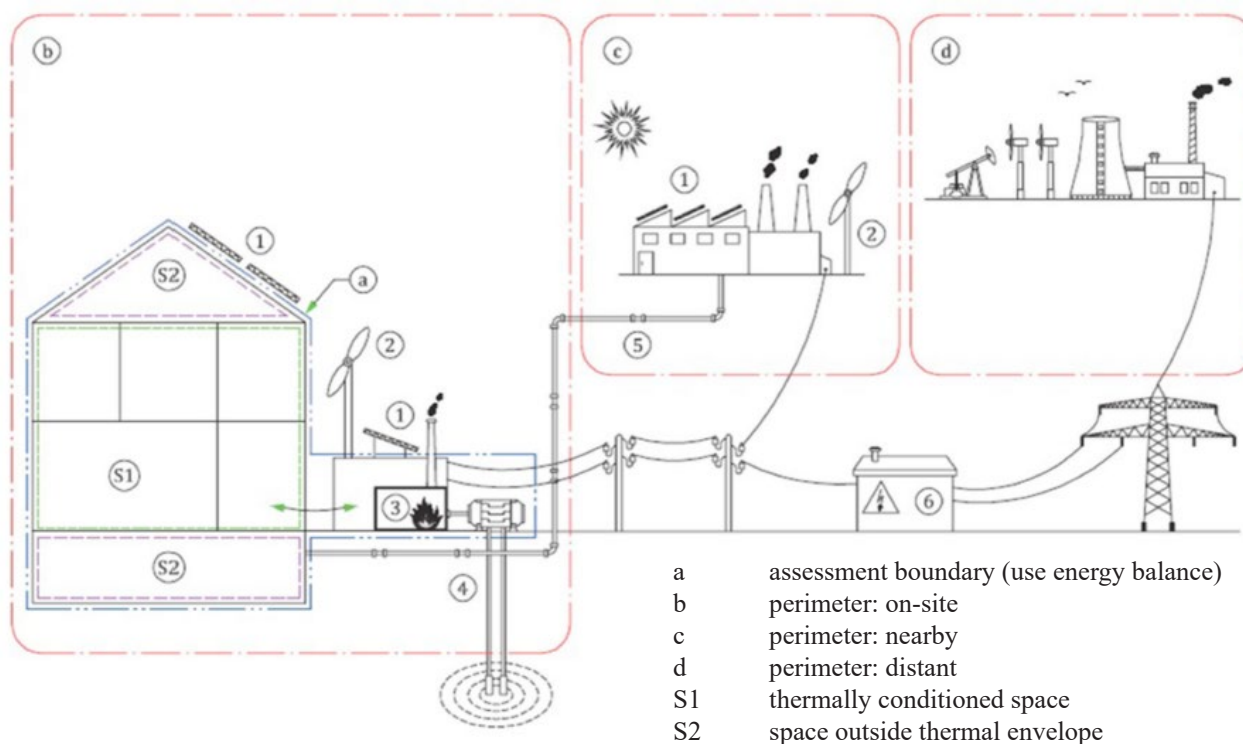


Figure 1. Assessment boundary set on a building. (EN ISO 52000-1:2017 [7])

Renewable energy delivered from nearby or distant in the total primary energy approach

Recital 22 of EPBD recast [1] states that ‘Energy derived from **combustion** of renewable fuels is considered to be **energy from renewable sources generated on-site** where the combustion of the renewable fuel takes place on-site’.

But the **General framework guideline [4]** treats the **biomass/biofuel energy as delivered from outside**. The same treatment is used in the Delegated regulation Annex [2] and CO guidelines [3]. The explanation is that ‘the energy from on-site generators based on bioenergy is a secondary energy carrier, since the primary energy carrier (e.g. solid biomass, biogases or biofuels) is supplied from outside building premises’.

However, the same consideration would apply to e.g. solar thermal or PV systems, where the primary energy carrier is the solar radiation crossing on-site perimeter and the secondary carrier is the thermal or electrical energy produced on-site, respectively.

Nevertheless, in the mentioned documents the **renewable energy, not to be accounted for in total primary energy use is**: PV electricity, solar thermal, ambient energy for heat pumps or geothermal energy, all produced and used on-site.

Following the approach proposed in the guidance documents, In **Figure 2** additional multiplier factor M_{prim} (or k_{exp})=1 is applied to different technical solutions based on district heating and on-site biomass combustion, while M_{prim} (or k_{exp})=0 for the systems harnessing on-site renewables. It can be seen from **Figure 2** that buildings connected to the renewables and heat pump based district heating systems as well as those fed on-site by solid biomass **have higher total primary energy use** (due to higher total PEF_{tot}) than those equipped with fossil fuels based systems. Also, the on-site systems with heat pumps have considerably lower total primary energy than heat pump based district heating system. The same applies for solar district heating systems vs. on-site solar thermal systems. These differences are much higher than when non-renewable primary energy is used as the main metric. This can cause problems for MSs to implement preferred technical systems in accordance with their National Energy and Climate Plans (**NECPs**) in the transient period, before ZEB standard [1] comes into force for all new and renovated buildings.

Consequences of the total primary approach

The requirement to use total primary energy as indicator for energy performance of a building causes several problems, as the valorization of renewable energies and the distinction between renewables and fossil fuels.

EPBD recast [1] indicates that the PEF factors (distinguishing non-renewable, renewable and total) or weighting factors per energy carrier, shall take into account the expected energy mix on the basis of its

En. use		Gas		En. use		HP
100		←		100		←
		100				30
		Edel				Edel
Eprim,nren	110			Eprim,nren	69,7	
Eprim,tot	110			Eprim,tot	75,8	
En. use		Biomass		En. use		DH - biomass
100		←		100		←
		100				100
		Edel				Edel
Eprim,nren	20			Eprim,nren	28	
Eprim,tot	120			Eprim,tot	165	
En. use		Solar therm. or PV		En. use		DH - solar
100		←		100		←
		100				100
		Edel				Edel
Eprim,nren	0			Eprim,nren	0	
Eprim,tot	0			Eprim,tot	110	
En. use		DH - average		En. use		DH - HP
100		←		100		←
		100				100
		Edel				Edel
Eprim,nren	130			Eprim,nren	76,7	
Eprim,tot	130			Eprim,tot	160	

Heat pump (HP) SPF = 3,3

District heating (DH) losses = 10%

DH - biomass power plant efficiency = 80%

Note: For DH-HP ambient heat is included in $E_{prim,tot}$ but it is not included for on-site HP (according to Del. Regulation [2]).

Figure 2. Comparison of total primary energy use (and non-renewable component) of the same building with different technical systems/energy carriers.

national energy and climate plans. This requirement states that the primary energy factors are based on a physical and statistical approach.

To valorize renewable energies, the guidance documents and delegated acts propose different methods as explained before:

- **different limits of the assessment boundaries** (including, or excluding on-site renewables),
- **additional multiplier factors** (weighing parameters) to take into account or not the renewables energies depending on the perimeters (on-site, nearby or distant). In the Commission documents these factors are only related to on-site renewables, but which should also include recital 22 of EPBD recast (e.g. biomass, biogas).

It seems that the second approach based on additional multiplier factors is more appropriate than the change of the assessment boundary. For example, the change of the assessment boundary does not include the renewable part of district heating systems, nor the renewables delivered from outside but burnt on-site. As already indicated (**Figure 2**), this might cause problems for MSs in implementing certain technical systems according to their NECPs and ZEB definitions.

Even if the approach based on addition multipliers seem to be more adapted, it is not mentioned how to account energies from nearby or distant, burnt on-site which contains partly renewables and non-renewables, for example biogas, biomass, district heating. The multiplier approach seems also only be proposed for on-site energies.

Finally with all these possible adaptations, the energy performance assessment is no longer based on the “**total**” primary approach. The term is misleading.

Conclusions

In this paper analyzed recently published Delegated Regulation [2] and guidance documents [3-6] should provide clarifications and practical recommendations for implementation of EPBD recast provisions concerning energy calculations. The obligation to determine ZEB energy demand threshold in terms of total primary energy (EPBD recast [1]) and to use it as a reference metric for cost optimum calculations (Delegated Regulation [2]), request **the use of total primary energy ($E_{prim,tot}$) for all EPB purposes instead of non-renewable energy ($E_{prim,nren}$) used in the most MSs so far (for EPCs, compliance**

with minimum energy requirements). However, the deduction of renewable energy produced on-site from the total primary energy as stipulated by the Delegated Regulation [2], questions the sense of this transition from $E_{prim,nren}$ to $E_{prim,tot}$. Furthermore, **if a certain approach is requested only for cost optimal calculations, it will be difficult to compare these results with the energy performance calculations by national methodology.**

In the guidance documents, the **on-site production of renewable energy is given priority over energy delivered from the grid. This may not be in line with NECPs of some MSs. Fortunately, the guidance documents provide MSs with some flexibility in adapting their calculation methodologies and cost optimal calculations to facilitate transition to “total” primary energy**, enabling also by that the implementation of **their NECP in the part relating to technical systems.**

In order to avoid the encountered different interpretations of the EPBD recast [1] provisions in a future and instead of creating an extensive guidance documents, the revision of the **overarching standard EN ISO 52000-1 shall provide clear definitions and simplifications of the crucial terms**) supported with practical examples and the calculation method. Such document could also be used by the other directives (e.g. EED [8], RED [9]) in order to avoid the present situation where different definitions are used for the same or similar terms and approaches (e.g. final energy, renewable energy).

References

- [1] Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast).
- [2] Delegated Regulation revising the methodological framework for calculating cost-optimal levels and its Annex, 2025.
- [3] Guidelines accompanying Commission Delegated Regulation (EU) .../... of 30.6.2025 to facilitate the application of the revised methodology framework for calculating cost-optimal levels, 2025.
- [4] Common general framework for the calculation of the energy performance of buildings (Annex I) guideline, 2025.
- [5] Zero-emission buildings (Articles 7 and 11) guideline, 2025.
- [6] Energy performance certificates (Articles 19-21, Annex V) and independent control systems (Annex VI) guideline, 2025.
- [7] EN ISO 52000-1:2017 Energy performance of buildings -- Overarching EPB assessment -- Part 1: General framework and procedures.
- [8] Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast).
- [9] Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652. ■