

An aerial photograph of a modern urban development, showing a mix of high-rise glass buildings and lower-rise structures with green roofs and integrated landscaping. The scene is bright and clear, suggesting a sunny day.

NEARLY ZERO: A REVIEW OF EU MEMBER STATE IMPLEMENTATION OF NEW BUILD REQUIREMENTS

POLICY BRIEFING

JUNE 2021

Since the beginning of 2021, all new buildings constructed within the EU must be nearly zero energy buildings (nZEBs), according to Article 9 of the EU Energy Performance of Buildings Directive 2010/31/EU (EPBD). The Directive further stipulates that all new buildings occupied and owned by public authorities constructed after 31 December 2018 must be nZEBs.

This policy briefing provides an overview of the status of implementation of Article 9 across EU Member States. It provides insights on how nZEB standards in Member States are aligned with the requirements of the EPBD. The intention is to inform ongoing policy discussions and consultations on the revision of the EPBD, as well as the wider EU climate policies and strategies, notably the EU Green Deal¹ and 2050 climate neutrality strategy² as they pertain to the building sector.

METHODOLOGY

The first part of the analysis consists of a compliance check across all Member States as to whether certain provisions of EPBD Article 9 were met or not. The second part considers the level of ambition of Member State nZEB standards.

Information gathering to address these questions was based largely on online research, including Member States' national nZEB plans³, websites of Member State governments, and European Commission publications or sources.

¹ https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

² https://ec.europa.eu/clima/policies/strategies/2050_en

³ https://ec.europa.eu/energy/topics/energy-efficiency/energy-performance-of-buildings/nearly-zero-energy-buildings/eu-countries-nearly-zero-energy-buildings-national-plans-0_en

It should be noted that the quality and clarity of information published by Member States, notably on official websites, differs significantly across the EU. Some Member States published lengthy and complicated documents from which it was difficult to extract headline results, while others were not explicit or clear on implementation dates or other key provisions. Accordingly, contact was made with national experts and with resident BPIE experts located in Member States to verify the analysis and fill in information gaps. BPIE would like to thank all those who contributed to this exercise.

Due to the complexity and variability in the ways in which nZEB standards are specified by Member States, the information within this briefing should be seen as a high level summary. For full details, please refer to the relevant national legislation or nZEB implementation plan

COMPLIANCE CHECKLIST

In this section, each Member State (or region, in the case of Belgium) is assessed as to whether the following basic provisions of the EPBD nZEB requirements were met:



- ✓ Was legislation in place in time to require all new publicly owned and occupied buildings to be nZEB from 1st Jan 2019?
- ✓ Was legislation in place in time to require all new buildings to be nZEB from 1st Jan 2021?
- ✓ Does the nZEB definition include a numerical indicator of primary energy use?
- ✓ Are renewable energy requirements clearly specified?

The results are summarised in Table 1 on page 3.

Table 1: Summary of renewable energy requirements within nZEB standards.

Country/Region	Was nZEB legislation in place for public buildings by January 2019?	Was nZEB legislation in place for all buildings by January 2021?	Is there a numerical indicator of primary energy use expressed in kWh/m ² per year?	Are renewable energy requirements clearly specified?
Austria	✓	✓	✗	✓
BE - Brussels	✓	✓	✓	✗
BE - Flanders	✓	✓	✗	✓
BE - Wallonia	✓	✓	✓	✗
Bulgaria	✗	✗	✓	✓
Croatia	✓	✓	✓	✓
Cyprus	✓	✓	✓	✗
Czechia	✓	✓	✓	✗
Denmark	✓	✓	✓	✓
Estonia	✓	✓	✓	✗
Finland	✓	✓	✓	✗
France	✓	✓	✓	✓
Germany	✗	✓	✗	✓
Greece	✗	✗	✓	✓
Hungary	✗	✗	✓	✓
Ireland	✓	✓	✓	✓
Italy	✓	✓	✗	✓
Latvia	✓	✓	✓	✗
Lithuania	✓	✓	✓	✓
Luxembourg	✓	✓	✗	✗
Malta	✓	✓	✓	✗
Netherlands	✓	✓	✓	✓
Poland	✓	✓	✓	✗
Portugal	✓	✓	✗	✓
Romania	✓	✓	✓	✓
Slovakia	✓	✓	✓	✗
Slovenia	✓	✓	✓	✓
Spain	✗	✓	✓	✓
Sweden	✓	✓	✓	✗

It can be seen that only 8 Member States complied with all four of these requirements: Croatia, Denmark, France, Ireland, Lithuania, Netherlands, Romania and Slovenia. The rest failed to adequately address at least one of the provisions.

Implementation of the timing provisions is discussed more fully below, while the energy requirements are discussed within the section on ambition.



PUBLICLY OWNED AND OCCUPIED BUILDINGS

Regarding the EPBD requirement for all new publicly owned and occupied buildings to be nZEB from 1st January 2019, most Member States met this date, although in some cases it was not possible to determine the precise implementation date. Four countries missed the deadline:

- **Germany** has progressively tightened building energy performance requirements in line with the EPBD since at least 2005, however the latest requirements aligned with nZEB standards entered into force only in November 2020.
- **Greece** introduced the requirement in its legislation in February 2013, setting the entry into force on 1st January 2019, but an amendment postponed it to 1st January 2021.
- **Hungary** postponed the introduction of nZEB requirements from 1st January 2018 to 30th June 2022.
- **Spain** had a new nZEB building code in place on 27th December 2019, but it only became mandatory from 24th September 2020.

By contrast, some Member States introduced this requirement before the deadline:

- 2016: **Denmark**
- 2017: **Sweden**
- 2018: **Czechia, Finland, Croatia**



ALL BUILDINGS

Since 1st January 2021, all new buildings across the EU, whether residential or non-residential, publicly, or privately owned, must be constructed to the national nZEB standard. This requirement was met in all countries except:

- **Bulgaria:** Ordinance 7 (2004) is awaiting amendments from the Ministry of Regional Development.
- **Greece:** The requirement and the entry into force date of 1st January 2021 was introduced in the legislation in February 2013, but an amendment made in May 2020 postponed it to 1st June 2021.
- As for public buildings, **Hungary** postponed the introduction from 1st January 2018 to 30th June 2022.

Member States introducing the requirement before the 2021 deadline include:

- 2016: **Denmark**
- 2017: **Sweden**
- 2018: **Finland**
- 2019: **Estonia**
- 2020: **Czechia, Spain, Croatia**





AMBITION LEVELS

Our analysis of ambition levels is based on the definition of nZEB within EPBD (Article 2, clause 2):

nZEB DEFINITION



A 'NEARLY ZERO-ENERGY BUILDING' MEANS A BUILDING THAT HAS A VERY HIGH ENERGY PERFORMANCE, AS DETERMINED IN ACCORDANCE WITH ANNEX I. THE NEARLY ZERO OR VERY LOW AMOUNT OF ENERGY REQUIRED SHOULD BE COVERED TO A VERY SIGNIFICANT EXTENT BY ENERGY FROM RENEWABLE SOURCES, INCLUDING ENERGY FROM RENEWABLE SOURCES PRODUCED ON-SITE OR NEARBY.



All Member States have now defined their nZEB requirements, including those which have yet to be formally introduced. To determine how ambitious these requirements are, we considered two main parameters:

- The energy performance of the building, expressed in primary energy consumed, and
- The share of energy requirements supplied from renewable sources produced on-site or nearby


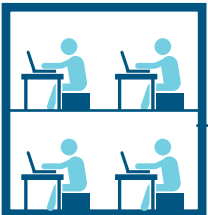
PRIMARY ENERGY REQUIREMENT

Clause 3 of EPBD Article 9 requires Member States to define their nZEB requirements in their national plans, including a numerical indicator of primary energy use expressed in kWh/m² per year. These may be varied for different building typologies within a country based on climatic zone, heating system, building geometry and other factors. Accordingly, many Member States have defined a range of values for a given building type. Where a published range is available, the Member States comparisons made in figures 1 and 2 shows the midpoint of the range, as well as the upper and lower limits.

In addition to climatic variations within a country, the European Commission has considered EU-wide climatic zones. In its 2016 nZEB Recommendations⁴, the European Commission published its benchmark thresholds for primary energy across the EU, differentiated according to four main climatic zones: Mediterranean, Oceanic, Continental, and Nordic. These recommended benchmark values are summarised below, for single family houses and offices, respectively, as per table 2. To facilitate comparative analysis and alignments with published European Commission guidelines, figures 1 and 2 incorporate these benchmarks and provide values for single family homes and offices, respectively.

⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016H1318>

Table 2: European Commission building energy performance and renewables benchmarks.

	A	B	C	D	E
		Net primary energy kWh/m ² /a	Energy supplied from renewable energy sources kWh/m ² /a	Primary energy threshold including that supplied from renewable sources kWh/m ² /a	Renewables as % of total primary energy (based on mid-point)
	SINGLE FAMILY HOUSE				
	Mediterranean	0-15	50	50-65	87%
	Oceanic	15-30	35	50-65	61%
	Continental	20-40	30	50-70	50%
	Nordic	40-65	25	65-90	32%
	OFFICES				
	Mediterranean	20-30	60	80-90	71%
	Oceanic	40-55	45	85-100	49%
	Continental	40-55	45	85-100	49%
	Nordic	55-70	30	85-100	32%

Countries with milder climates are expected to have both the lowest net primary energy requirements (Column B above) and the highest share of renewables (Column E). However, when considering the primary energy requirement of the building irrespective of whether it is supplied from renewable sources or not (i.e. Column D), the range across the 4 climatic zones is much narrower:

- For single family houses, the range is 50-90 kWh/m²/a
- For offices, the range is 80-100 kWh/m²/a

It is important to note that several Member States and one Belgian region do not specify kWh/m²/a values or ranges for energy performance for new buildings as part of their nZEB requirements. Instead, they are based on minimum performance levels or achievable performance ranges calculated in comparison to reference buildings and considering building typology, U-values, geometry, climatic region, and a range of other factors. This approach is used notably in: Austria, Flanders (Belgium), Germany, Italy, Luxembourg, and Portugal.

Given these variations, these Member States and Flanders are excluded from the comparisons shown in figures 1 and 2.



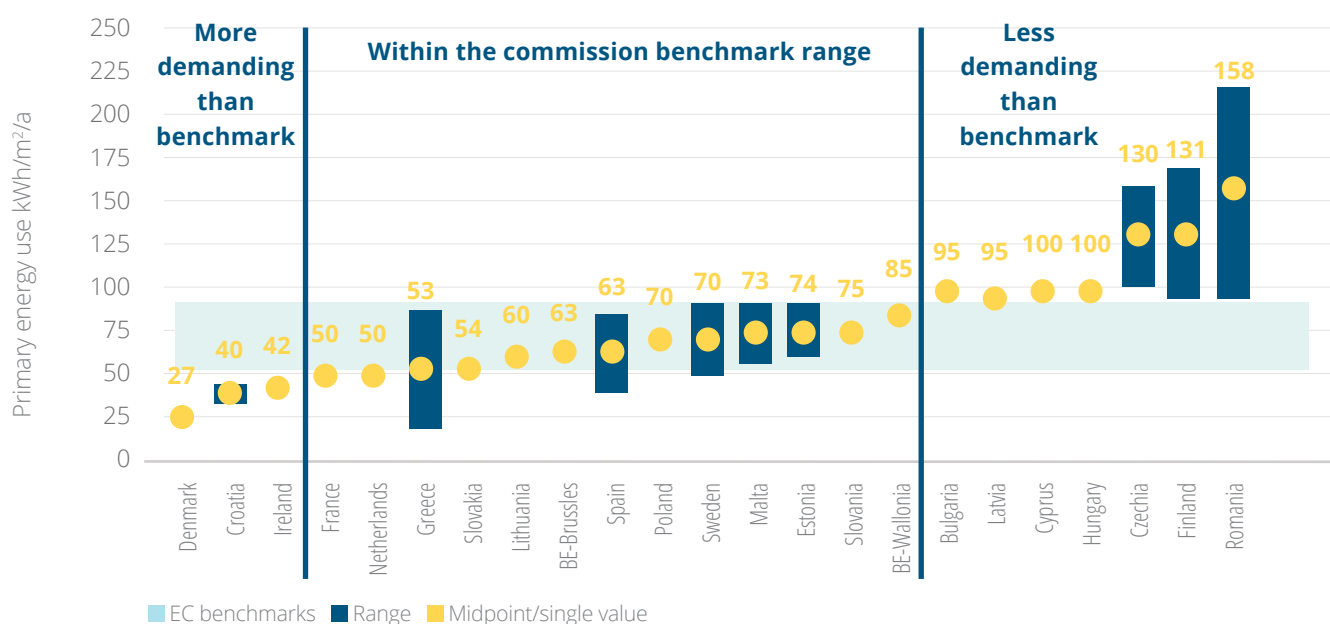
nZEB STANDARD FOR SINGLE FAMILY HOUSES

21 Member States and 2 Belgian regions (Brussels-Capital Region and Wallonia) published values or a range of values⁵ specifying the primary energy requirement for single family houses. Of these:

- 13 fall within the Commission's benchmark range of 50-90 kWh/m²/a
- 3 are lower (i.e. more demanding) than the benchmark: Denmark, Croatia, Ireland
- 7 are higher (i.e. less demanding) than the benchmark: Bulgaria, Latvia, Cyprus, Hungary, Czechia, Finland, Romania

Values are summarised in figure 1.

Figure 1: nZEB kWh/m² per year values for single family homes in the EU.



It can be seen that there is a large discrepancy in energy performance requirement between Member States. The value for Romania is 157 kWh/m²/a (based on the midpoint of the range), which is nearly six times that for Denmark (27 kWh/m²/a).

⁵ Where Member States provide a range of values, we have taken the midpoint in this analysis.



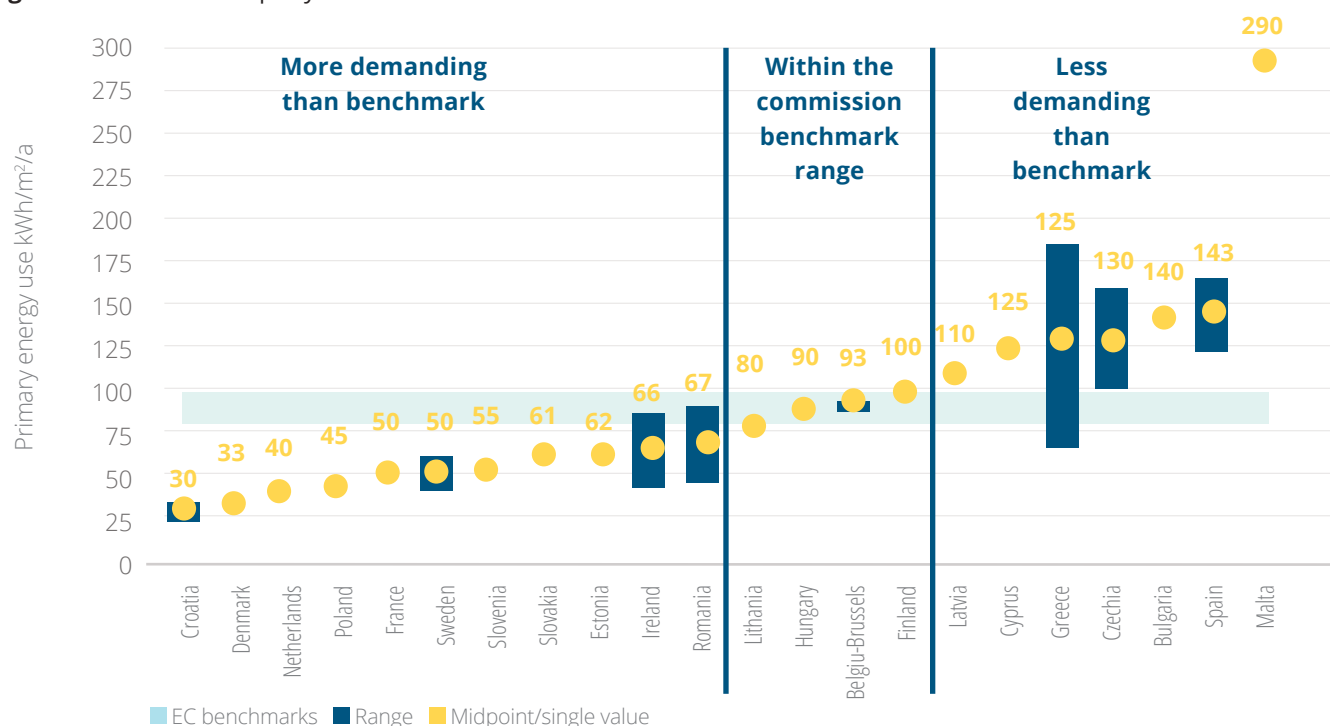
nZEB STANDARD FOR OFFICES

21 Member States and the Brussels-Capital Region of Belgium published values or a range of values⁶ specifying the primary energy requirement for offices. Of these:

- 4 fall within the Commission's benchmark range for offices of 80-100 kWh/m²/a
- 11 are lower (i.e. more demanding) than the benchmark: Croatia, Denmark, Netherlands, Poland, France, Sweden, Slovenia, Slovakia, Estonia, Ireland, Romania
- 7 are higher (i.e. less demanding) than the benchmark: Latvia, Cyprus, Greece, Czechia, Bulgaria, Spain, Malta

The values are summarised in figure 2.

Figure 2: nZEB kWh/m² per year values for offices in the EU.



The variation in performance is even wider than for single family houses. The nZEB standard in Malta, at 290 kWh/m²/a, is nearly 10 times that in Croatia (based on its mid-point value of 30 kWh/m²/a).



RENEWABLE ENERGY REQUIREMENT

The way renewable energy requirements are dealt with varies greatly. Only a handful of Member States provide minimum values in legislation in a way that is comparable to the European Commission benchmarks. These are expressed as a minimum share of renewable energy contribution to the total primary energy demand, which range from 32% for the Nordic climatic zone to 87% for single family houses in the Mediterranean climatic zone (as per column E in Table 2). These Member States include:

- Ireland: 20%
- France: 20% for multi-family housing and 30% for single family housing
- Hungary: 25%
- Croatia: 30%
- Netherlands: 40% for residential and 30% for offices
- Lithuania: 50%
- Portugal: 50% for residential only
- Bulgaria: 55%

⁶ Where Member States provide a range of values, we have taken the midpoint in this analysis.

In all cases except Lithuania and Bulgaria, these values are lower than the European Commission's benchmark values for the relevant climatic region.

Other Member States had various different ways in which renewable energy requirements were specified:

- Austria offers a set of options for achieving renewables requirements, such as heating and hot water needs met by 80% by renewable sources, or 20% of electricity sourced from solar PV.
- Denmark specified a maximum level of 25kWh/m²/a renewable energy can be included in the energy framework calculation.
- German requirements are based on several options, including: 15% for solar thermal or solar PV, and 50% for geothermal, waste heat or biomass.
- Portugal sets a minimum contribution of renewable energy only for residential buildings (50% of the total primary energy consumption), whereas for non-residential ones no minimum limit is defined.
- Some countries (Greece, Italy, Slovenia, Spain) only specified minimum shares of domestic hot water to be provided by renewable energy.
- Sweden stated that the high content of low carbon sources in its energy mix obviated the need to specify a renewables requirement in its nZEB standard.

Remaining Member States either did not specify a numeric value or argued that nZEB standards are sufficiently demanding as to effectively require a significant contribution from renewable sources.



Conclusions

Based on the information presented in this briefing, there is a wide degree of disparity across Member States in terms of the implementation of the Article 9 nZEB provisions of the EPBD. Differences are present, notably with respect to:

- The availability and clarity of information regarding nZEB requirements on government websites
- Timeline of implementation of Article 9 requirements, with some Member States delayed while others introduced the requirements ahead of the deadlines
- Definitions and metrics used in determining national nZEBs
- Calculation methodologies and levels of energy performance that new buildings are required to achieve to attain nZEB status
- The extent to which residual energy requirements need to be covered by renewable energy

These differences are important considerations for EU policy makers as they look towards a revision of the EPBD and given the potential for nZEBs to contribute to the EU's wider objective of a highly energy efficient and decarbonised building stock by 2050.

It is also noteworthy that nZEB standards in some Member States were calculated some years ago, even if they only became law for all buildings at the start of this year. This means that they are not based on the latest cost data, which is particularly important given the significant reductions in costs of renewable energy. Furthermore, the standards do not reflect the EU's commitment in 2020 to achieve climate neutrality by 2050.

Considering the lifecycle of buildings, new construction should not need to go through a major renovation between now and 2050. While buildings constructed between 2021 and 2050 will not constitute most of the overall building stock by mid-century, the standards for new build also set the tone for decarbonising the existing stock as they can and should become a benchmark for renovation as well. This is particularly relevant as the EPBD revision considers the introduction of a definition or standard for "deep renovation"⁷. One should also keep in mind that the nZEB standard is used as a reference point in the Taxonomy technical screening criteria for new buildings⁸. For all these reasons, it is crucial that the implementation of nZEB definition at national level is done thoroughly and ambitiously.

⁷ European Commission, *Communication "A Renovation Wave for Europe: greening our buildings, creating jobs, improving lives"*, 14th October 2020, page 13.

⁸ European Commission, *Annex to the Delegated Regulation*, 2021, page 165.

Policy Recommendations



EUROPEAN COMMISSION

EUROPEAN COMMISSION TO ENSURE THAT:

- The methodology used to set nZEB requirements is harmonised across Member States.
- Numeric indicators are included in (or linked to) the nZEB definition in the revised directive for maximum primary energy use, possibly in the form of ranges based on European Commission benchmarks.
- Requirements are introduced in (or linked to) the nZEB definition in the revised directive requiring all new buildings to be supplied by renewable energy sources only, rather than the current “to a very significant extent”, which has been interpreted very differently across the EU. Allowing fossil fuel-based systems to be installed in new buildings will create a damaging lock-in effect, which can and should be avoided.
- A new standard is introduced in the revised directive requiring all new buildings constructed as of 1 January 2030 (latest) to be positive energy/net-zero carbon over their lifecycle⁹.

THE EUROPEAN COMMISSION SHOULD ALSO COMPLY WITH REQUIREMENTS TO MONITOR AND REPORT ON nZEB IMPLEMENTATION PROGRESS, DUE EVERY FOUR YEARS UNDER THE GOVERNANCE REGULATION ARTICLE 35, AND THE EUROPEAN COMMISSION SHOULD MONITOR/ENFORCE THE IMPLEMENTATION OF THE “ENERGY EFFICIENCY FIRST” PRINCIPLE IN MEMBER STATES.



MEMBER STATES SHOULD:

- Implement the “energy efficiency first” principle¹⁰ and correct their nZEB standards in terms of energy performance requirements in accordance with Commission benchmarks/EPBD.
- Comply with requirements from the Governance Regulation to report progress (by March 2023) on implementation of nZEB standards in construction, and link this to the reporting on long-term renovation strategies.
- Improve the transparency and availability of information about energy performance and renewable energy requirements and values for new buildings.

⁹ BPIE (Buildings Performance Institute Europe) (2021). Introducing whole-life carbon metrics: recommendations for highly efficient and climate-neutral buildings. Available at: <https://www.bpie.eu/publication/introducing-whole-life-carbon-metrics-recommendations-for-highly-efficient-and-climate-neutral-buildings/>.

¹⁰ *Governance Regulation*, Article 2(18); ‘energy efficiency first’ means taking utmost account in energy planning, and in policy and investment decisions, of alternative cost-efficient energy efficiency measures to make energy demand and energy supply more efficient, in particular by means of cost-effective end-use energy savings, demand response initiatives and more efficient conversion, transmission and distribution of energy, whilst still achieving the objectives of those decision

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COMPLIANCE CHECKLIST

- ✓ Was legislation in place in time to require all new publicly owned and occupied buildings to be nZEB from 1st Jan 2019?
- ✓ Was legislation in place in time to require all new buildings to be nZEB from 1st Jan 2021?
- ✓ Does the nZEB definition include a numerical indicator of primary energy use?
- ✓ Are renewable energy requirements clearly specified?

PUBLIC BUILDINGS



ALL BUILDINGS

