CONCERTED ACTION
ENERGY PERFORMANCE
OF BUILDINGS

National applications of the NZEB definition – The complete overview

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Introduction

The Energy Performance of Buildings Directives (EPBD) 2010/31/EU includes a general definition of a nearly zero-energy building (NZEB) and a requirement for the Member States (MSs) that all new buildings have to fulfil the NZEB level by the end of 2020 and all new public buildings by the end of 2018. The Concerted Action EPBD has continuously followed and supported the development of the national applications in practice of the NZEB definition and has published a detailed public report on the status of the national NZEB definitions in April 2015.

Updates of the national NZEB definitions have been the focus of work at the end of 2017. Based on feedback from MSs' delegates, this factsheet summarises the progress of the national NZEB definitions during the last 34 months.

Main points of the NZEB definition

The main requirements of EPBD Articles 2 and 9 regarding the national application of the NZEB definition for new buildings can be summarised as follows:

The national application of the definition shall specify:

- a very high energy performance of the building;
- a very low amount of energy required by the building;
- a numerical indicator of primary energy in kWh/m².year.

Furthermore, the national application of the definition should contain:

- a very significant contribution of renewable energy to cover the remaining energy use.

For the overview at hand, the following five main points have been analysed per country:

1. Is there a detailed NZEB definition available?
2. How is the "very high energy performance" expressed?
3. Where are the limits defined for "a very low amount of energy required"?
4. Is there a requirement for "covered to a very significant extent by energy from renewable sources"?
5. Is a "primary energy indicator in kWh/m².year" in use?

The table below was developed based on the detailed information provided by MSs' delegates. In some cases, additional requirements/limits might apply but have not been reported.

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Main points of the national NZEB definition (as reported by the CA EPBD delegates)			Country																																	
				Belgium																																	
			Austria	Brussels	Flanders	Walloon	Bulgaria	Croatia	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg *	Malta	Netherlands	Norway	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	United Kingdom
Detailed definition	Included in a legal document	Governmental decree/law		■	■	■	■		■				■				■		■	■		■	■			■			■	■		■	
		Technical regulation						■		■	■	■		■				■	■		■								■					
		National NZEB plan	■					■																				■		■				
	Not yet included in a legal document														■	■						■		■	■		■				■		■	
	Draft available														X							X		X							X		
Very high energy performance	Tighter requirements compared to current values for	General												■												■					X		
		Mean U-value of building envelope								■																								
		Reference technologies								■																		■						
		Heating energy demand																												■				
		Final energy	■																															
		Primary energy				■	■	■		■			■						■									■	■	■				
		(Primary) energy performance coefficient			■	■																		■										
	Top building class						■		■			■					■	■		■	■	■	X	■						■				■
	Specific new building class										■																							
	Passive house (building envelope) level			■																														
	KfW efficiency house 55/70														X																			
Nearly zero or very low amount of energy required. Limits on:	Component U-values				■	■			■								■	■	■					■		■			■	■	X		
	Thermal bridges																	■																
	Mean U-value of building envelope				■	■	■			■					X									■						■		■	
	Heat transfer coefficient/heat loss of building envelope																		■		■													
	Air permeability																	■																
	(Net) heat demand		■	■					■						X		■					■	X											
	Installed lighting power								■																									
	System efficiencies						■										■	■	■															
	Heating energy demand																		■	■										■	X			
	Cooling energy demand																		■												X			
	Total energy efficiency		■																															
	Electrical input																															■		
	Final energy (total or divided into energy uses)		■							■																■			■				X
	Primary energy			■	■	■	■	■	■	■	■	■	■	■	X		■	■	■	■	■	■	X	■	X		■		■	■	■	X	■	
	CO_2 emissions		■															■										■						X
	Summer overheating																■		■															
Very significant extent of renewable energy	Direct	Minimum share in %	■		■		■	■	■						X		■	■	■	■	■		■					■	■	■				
		Minimum contribution in kWh/m².year			■									■				■																
		(Choice of) exemplary RES measures	■		■						■								■															
	Indirect **			■		■				■	■	■	■									■	X	X		■					X	■	X
Primary energy indicator in kWh/m².year	Included		■	■		■	■	■	■	■	■	■	■	■	X		■		■	■	■	■	X	■		■		■	■	■	X	■	
	Other main indicator, but PE as additional/interim result. Main indicator:	CO_2																																X
		Primary EP coefficient			■	■												■						X										

* At the time of the factsheet Luxembourg had a national NZEB definition for residential buildings in place, but not yet a NZEB definition for non-residential buildings.
** Indirect: RES contribution required in order to achieve the minimum energy performance requirements.

Cross analysis

National NZEB definitions

The table shows that, by February 2018, a national NZEB definition was included in a legal document in 20 countries plus all three Belgian regions (21 countries in total). Luxembourg has published the national NZEB definition for residential buildings in a legal document but is still working on the NZEB definition for non-residential buildings. If the Belgian regions are separately counted, this means that 23.5 of 31 countries[i] or regions have published the NZEB definition in a legal document; this corresponds to 76% of 31 countries or regions in total. This is a considerable increase compared to the CA EPBD report published in April 2015. At that time, about 60% of the countries had laid out their detailed NZEB definition in a legal document. Most countries use a governmental decree or law for defining the NZEB; fewer use a technical regulation or simply the national NZEB plan. In some cases, a governmental decree is used for the general definition, and a technical regulation includes the details.

In 7.5 countries[i] the national detailed NZEB definition is not yet published; in 3.5 of them there is, however, a draft available. CA EPBD has investigated barriers that prevent some countries from legally fixing their national NZEB definition:

- The relevant legislation has been postponed due to political or economic uncertainty (e.g., elections, recession).
- The definition has been prepared but the relevant regulation has not yet come into force (e.g., because this will be implemented when the national building standards are next reviewed).
- Targets in terms of primary energy and the proportion of renewable energy are under review based on the results of cost-optimal studies.
- Splitting the requirements into more building types (e.g., having separate requirements for hospitals) is being considered.
- There is a need to consult stakeholders before the definition is officially approved.
- There are problems in accounting for the effect of regional climatic differences.
- Technical building codes and benchmarks are delayed due to the implementation of CEN standards.
- Directive 2010/31/EU has not been formally included in the Agreement on the European Economic Area (EEA), and is thus not implemented in Norway, but there is the political will to implement the Directive and work on the definition is ongoing.

Most countries expect to have a detailed NZEB definition legally established in 2018.

Very high energy performance

The very high energy performance is mostly expressed in tighter requirements compared to current energy performance requirements for new buildings or in top building classes in the energy performance certificate. Tighter requirements are set on varying characteristics but include mostly tighter primary energy requirements.

Nearly zero or very low amount of energy required

The limits for the nearly zero or very low amount of energy required are set on primary energy in nearly all countries (22.5 countries[i]) and, additionally, on component U-values in several countries (9 countries), mean U-value of the building envelope (6 countries), net heat demand (4.5 countries[i]), final energy (4 countries) and system efficiencies (4 countries). Other kinds of limits apply, such as heating and cooling energy demand, CO_2 emissions, electrical input and summer overheating.

Very significant extent of renewable energy

Most countries (16) with an available detailed NZEB definition have defined direct RES requirements for NZEBs. Typically, they are included as a required minimum share (percentage) of the energy use, but also minimum contributions in kWh/m².year, and choices of defined exemplary RES measures apply. In 8.5 national NZEB definitions[i] no such direct RES requirements are contained; however, in the very most cases, RES contributions are necessary to meet other minimum energy performance requirements. This can be seen as indirect RES requirements.

Primary energy indicator

An explicit primary energy indicator in kWh/m².year is included in 21.5 of the countries[i]. Two countries use a primary energy performance coefficient as main indicator but have the primary energy indicator as an additional or interim result.

Conclusions

With the deadlines at the end of 2018 (new public buildings) and at the end of 2020 (all new buildings) fast approaching, more and more Member States have their national application of the NZEB definition in place. By February 2018, a total of 76% of the countries have defined detailed NZEB requirements in legal documents. The remaining countries mostly have drafts available that are based on studies. They foresee to conclude the work on the NZEB definition within 2018.

CA EPBD has analysed not only the status of work of the NZEB definition in the countries, but also the political, economical, technical and procedural barriers that prevent or delay MSs from fixing their NZEB definition. The CA EPBD also supported the MSs in their work by detailed discussions and exchanges between delegates.

The national NZEB definitions differ significantly from each other. This is documented in the tabular overview that deals with the four main points of the general NZEB definition in the EPBD. Limits for the energy performance are, for example, set in addition to primary energy on many different characteristics. Further deviations that prevent the comparison of national NZEB definitions among MSs are different calculation methods, building culture, climate, investment and energy costs, etc.

During the CA EPBD work on the national NZEB definitions it also became apparent that some of the definitions underwent changes since the first publication. Further revisions are planned. The reasons for this include the use of new calculation methods (including the change towards the new CEN EPB calculation standards), new cost-optimal studies which take the situation in 2020 into account, and reduced required RES contributions, as studies showed that the earlier ones are difficult to achieve in the urban context.

Further readings

- European Commission: Evaluation of Directive 2010/31/EU on the energy performance of buildings. Commission staff working document. 30.11.2016. SWD(2016) 408 final. Available at https://ec.europa.eu/info/sites/info/files/swd-2016-408-final_en_0.pdf
- D'Agostino, D. et al.: Synthesis Report on the National Plans for Nearly Zero Energy Buildings (NZEBs). Progress of Member States towards NZEBs. JRC science for policy report. 2016. Available at http://publications.jrc.ec.europa.eu/repository/bitstream/JRC97408/reqno_jrc97408_online%20nzeb%20report(1).pdf

[i] Luxembourg has legally fixed the national NZEB definition for the residential buildings, but not yet for the non-residential buildings. It is therefore counted as “half” a country in the statistical analysis.

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