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## **Thresholds related to renovation of buildings**

### *EPBD definitions and rules*

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## Thresholds related to renovation of buildings - EPBD definitions and rules

The EPBD Buildings Platform has initiated an investigation on the implementation status in the different European Member States (MS) of the two thresholds related to the renovation of existing buildings referred to in the Energy Performance of Buildings Directive (EPBD). These thresholds are: 1) the 25 % limits that define when a renovation is to be considered as major and 2) the 1 000 m<sup>2</sup> limit on the building's size, over which minimum energy performance requirements must be met in the case of a major renovation, to the extent that this is technically, functionally and economically feasible.

This paper gives an overview of the results of the study.

### 1 > Related EPBD articles

This study deals with the benefits and limitations of the thresholds related to the 1 000 m<sup>2</sup> limit for existing buildings that undergo major renovation (The Directive on the Energy Performance of Buildings (Directive 2002/91/EC) [1] Article 6) and the two 25 % rules regarding the definition of major renovations (recital 13)):

*EPBD: Article 6 - Existing buildings: Member States shall take the necessary measures to ensure that when buildings with a total useful floor area over 1 000 m<sup>2</sup> undergo major renovation, their energy performance is upgraded in order to meet minimum requirements in so far as this is technically, functionally and economically feasible. Member States shall derive these minimum energy performance requirements on the basis of the energy performance requirements set for buildings in accordance with Article 4. The requirements may be set either for the renovated building as a whole or for the renovated systems or components when these are part of a renovation to be carried out within a limited time period, with the abovementioned objective of improving the overall energy performance of the building.*

The questionnaire covered the main headers listed below.

- > Information regarding major renovations (25 % rules)
- > Information regarding the 1000 m<sup>2</sup> limit
- > Energy performance requirements for renovated buildings
- > System and component requirements
- > CE labelling or national labelling of components or systems
- > Other energy requirements that must be complied with
- > Compliance mechanisms
- > Pros and cons of present regulations
- > Link between renovation of buildings and national certification schemes
- > Best practice examples in national legislation
- > Support systems to stimulate investments in energy efficiency improvements of the buildings

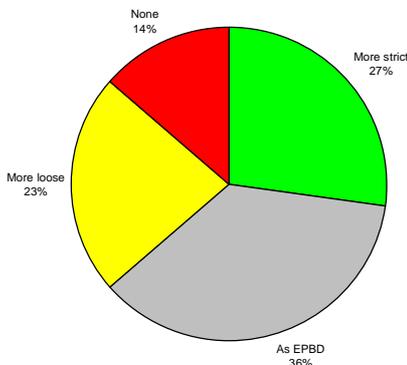
*EPBD: recital 13: Major renovations of existing buildings above a certain size should be regarded as an opportunity to take cost-effective measures to enhance energy performance. Major renovations are cases such as those where the total cost of the renovation related to the building shell and/or energy installations such as heating, hot water supply, air-conditioning, ventilation and lighting is higher than 25 % of the value of the building, excluding the value of the land upon which the building is situated, or those where more than 25 % of the building shell undergoes renovation.*

## 2 > Study methodology

Information was collected using a questionnaire that was sent to representatives of the 27 MS of the European Union, as well as Croatia, Norway and Switzerland, during spring 2008. Twenty-five questionnaires were returned, namely, from: Austria, Belgium (Flanders), Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, the Netherlands, Poland, Portugal, Romania, the Slovak Republic, Spain, Sweden, the United Kingdom (England & Wales), Croatia, Norway and Switzerland. The illustrations and figures that follow refer to the 22 answers received from the MS. The results of the study are based on the information provided by the respondents and not on analysis of legal texts, therefore, omissions are possible.

## 3 > Major renovation

The definition of a major renovation varies significantly, ranging from a more gentle definition or none at all, to the definition used in the EPBD or an even stricter definition. In Germany, for instance, the definition of a major renovation is based on the ratio of the building component with the same orientation that needs to be exchanged or renovated. For example, if more than 20 % of windows facing south have to be replaced, minimum energy performance requirements for renovations have to be met, similarly with more than 20 % of the roof (here, without taking the orientation into account). In addition to the 25 % threshold, several MS have special requirements for building components and systems, when these are replaced or renovated.



MS's definition of the 25 % rule compared with the EPBD definition.

Other countries have a more vague definition of a major renovation, e.g., that the cost is significant compared to the value of the building, though without a precise definition of significance. In many countries, the definition of major renovations only applies to the renovation of large buildings, although a uniform definition of a large building does not exist in the MS.

In 36 % of the MS the representatives of which responded, there is a definition of the 25 % rules that is similar to the definition given in the EPBD, while 27 % have stricter rules (forcing more buildings to implement energy saving measures). Another 37 % have looser rules or no definition whatsoever of a major renovation.

#### 4 > 1 000 m<sup>2</sup> threshold

According to the EPBD, Member States should take the necessary measures to ensure that, when buildings with a total useful floor area over 1 000 m<sup>2</sup> undergo major renovation, their energy performance is upgraded in order to meet minimum requirements, in so far as this is technically, functionally and economically feasible. Member States should derive these minimum energy performance requirements on the basis of the energy performance requirements set for buildings in accordance with Article 4 (Setting of energy performance requirements). The requirements may be set either for the renovated building as a whole or for the renovated systems or components, when these are part of a renovation to be carried out within a limited time period, with the abovementioned objective of improving the overall energy performance of the building.

In general, there are two approaches to the 1 000 m<sup>2</sup> threshold: one follows the threshold as stated in the Directive; and the other has a lower or practically no limit in terms of the area of a building (above which, in case of a major renovation, the rules for improvements of the energy performance need to be followed). In most of these cases, the lower area limit follows the general rule for new buildings in the national building regulations, typically, that buildings between 10 and 40 m<sup>2</sup> must have a building permit. In 55 % of the MS, which took part in the study, stricter rules than those required in the EPBD apply.

#### 5 > Other renovation specific issues

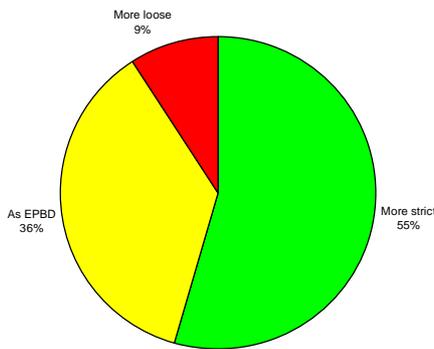
A number of general questions in relation to building renovation were included in the questionnaire. Even though the questionnaire clearly focused on energy rules related to building renovation, many answers were given with respect to the energy rules that apply to new buildings. The answers were thus ambiguous and, therefore, the interpretation of the findings was partly based on the authors' experience.

Seventeen of the MS that took part in the study have energy requirements for retrofitting individual parts of the building envelope or the energy systems of the building. These requirements are easy to comply with, compared to requirements for the overall energy performance of the renovated building. In 9 MS there are energy performance requirements for the entire renovated building, while 3 MS have energy performance requirements solely for the renovated zone. In 10 MS, building or zone requirements are combined with requirements for individual components.

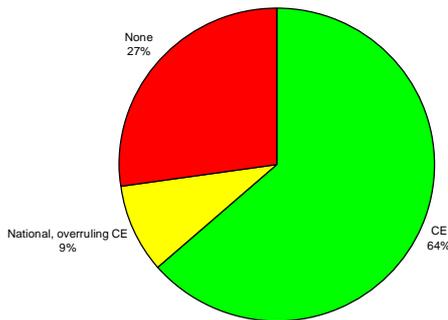
When dealing with the total renovation of an existing building or with the change in use of a building, some MS have the same requirements for the renovated buildings as for new buildings. Other MS have requirements for building components, but no requirements for the total energy performance of the renovated building.

The requirement for implementing mandatory energy improvements in relation to individual components can be neglected in some MS, if the energy saving measure is calculated not to be cost effective.

The energy performance calculation will, in most MS, be performed for the whole building, even though only a section is renovated. In some MS it is possible to perform the calculation solely for the renovated section.



*MS's compliance with the 1 000 m<sup>2</sup> threshold.*



*Compliance in national requirements with the CE labelling of components or systems in MS.*

## 6 > Conclusions and recommendations

This study shows that there are many different regulations concerning building renovation in the European MS. The lists below give recommendations and present the pros and cons of each suggestion.

### Pros and cons regarding the implementation of renovation thresholds in the EPBD

Based on the participants' answers and the authors' experience, the following statements were extracted and grouped according to four different rules in the EPBD, namely, the two threshold limits and the energy performance for buildings and building components.

Some general statements regarding the implementation of the EPBD were also extracted from the questionnaire:

- > Focus on energy will increase the indoor quality of the renovated building. Increased air tightness does, however, need to be followed up by ensuring a sufficient ventilation rate.
- > Renovations of buildings that comply with the requirements change the building industry ethics and, further, the market price of building stock.
- > Compliance with the different rules is not monitored in all MS.
- > It has proven to be important that energy saving measures are cost-effective within a specified period of time.
- > Recommendations applied on a voluntary basis generally have smaller market penetration than official rules.
- > European legislation could give minimum requirements regarding overall building energy performance, but allow the MS to set stricter requirements.
- > Minimum requirements for individual components are used in many MS and seem easy to manage.

### The 25 % limits for major renovations

Recession may cause the value of buildings to drop. Major renovations due to the 25 % value threshold may thus cover more buildings and a larger part of the building stock will be forced to undergo energy improvements. On the other hand, recession could result in a decrease in the number of energy performance measures.

Pros:

- > Relatively easy to identify when a renovation is considered as major.

Cons:

- > It might be expensive and complicated for the building owner to comply with the regulations, which may in turn lead to a tendency to postpone the renovations or split them into stages (each one below the 25 % limits).
- > Minimum requirements for individual components are easier to manage than the 25 % rules.
- > Easy to identify when a renovation is considered as major, but meeting the minimum energy performance requirements still entails some up-front costs (in MS where this rule applies).
- > A major renovation may come into effect due to the 25 % building value threshold in some regions while not in other regions for the "same" building; there are large regional differences in building prices.

## The 1 000 m<sup>2</sup> threshold

### Pros:

- › Lowering the 1 000 m<sup>2</sup> threshold will substantially increase the number of buildings affected and, consequently, the impact of the EPBD.
- › At present, many countries also have renovation requirements for buildings of less than 1 000 m<sup>2</sup> and the lower threshold has already proven its functionality in these MS.

### Cons:

- › The administrative workload of building renovations may be significant if this threshold is lowered, as many small buildings will also be included. However, administration will depend on the control mechanisms applied.
- › Lowering the threshold may not necessarily have a major impact in terms of energy performance on the EU as a whole, because many MS already have a threshold that is lower than 1 000 m<sup>2</sup>.

## Introduction of European minimum energy performance targets for building renovations

### Pros:

- › Such a requirement will force certain MS to make their national requirements stricter.
- › If introduced well, it will accelerate the implementation of stricter energy performance targets.
- › Linking the energy performance in the certificate with a social housing subsidy scheme will increase the implementation of energy saving measures.
- › The introduction of minimum energy performance targets rewards good designers and technicians, as meeting them requires cooperation and a holistic approach to building renovation.

### Cons:

- › The development of a coherent approach to expressing such a requirement in the common EPBD text is not evident; in any case, it should take climate differences, differences in building styles and building use into account.
- › Such a minimum requirement should take into account the way market control is organised. At present, some countries have almost no control over the application of legislation; strict requirements are, therefore, easy to set, but as compliance is not monitored their value is questionable. On the other hand, other countries already have a strict control scheme.
- › A large administrative system is needed in order to control whether the energy performance of renovated buildings meets certain requirements.
- › The introduction of fines or similar penalties may be called for, in those cases in which the energy performance of the renovated building does not meet the requirements.
- › Compliance with energy performance requirements may hinder major renovations, if the procedure for meeting the regulations is too complicated or costly.

## Introduction of European energy performance targets for individual building components and systems

### Pros:

- › Can be very appropriate for the renovation market.
- › Can be proposed as an alternative target instead of, or in combination with, an overall energy performance target.
- › Will encourage the industry to develop more energy efficient products and supply them at a lower cost than special products.
- › U-value requirements are rather simple to understand and meet.
- › Simple and easy to follow.
- › Except in the case of a major renovation in the sense of a complete re-cladding, elemental limits are to be preferred, as they are simpler to administer.
- › May potentially establish a strong European market platform of energy efficient components and systems.

### Cons:

- › May allow for the loosening of energy performance targets in the MS that already have strict requirements.
- › A U-value requirement will in some cases conflict with the technical and functional feasibility of the measure.

Table 1. Summary of answers to questions with a limited number of possible answers. The green column shows the summary for EU27. The yellow column includes Croatia, Norway, and Switzerland.

	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	EP	SE	UK (England&Wales)	HR	NO	CH						
	Austria	Belgium (Flanders)	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	UK (England&Wales)	Croatia	Norway	Switzerland	EU27	EU27+3				
<b>1.1</b>	<b>Describe your national definition of a major renovation</b>																																			
More strict																																6	6			
As EPBD	x			x	x	x				x	x				x																		8	8		
More loose												x					x																5	7		
None		x						x																									3	4		
<b>1.2</b>	<b>How are the terms "technically, functionally and economically feasible" as stated in Article 6 of EPBD interpreted in the national implementation?</b>																																			
Definition	x					x			x	x			x	x	x	x				x							x	x		x	x	12	14			
No definition		x			x	x		x	x			x	x								x	x											11	12		
<b>2.1</b>	<b>Describe your current national regulation regarding the implementation of the 1000 m<sup>2</sup> limit including any other requirements related to area limits:</b>																																			
More strict		x				x	x		x	x	x				x	x																	12	15		
As EPBD	x				x							x																						8	8	
More loose													x																					2	2	
<b>2.2</b>	<b>Planned national regulation regarding the implementation of the 1000 m<sup>2</sup> limit including any tighter requirements</b>																																			
Tightening planned																																		3	3	
No additional tightening	x	x			x	x	x		x	x	x	x																						19	22	
<b>3.1</b>	<b>Definition of energy performance requirements for renovated buildings</b>																																			
Building performance	x					x			x	x	x																							9	11	
Zone performance																																			3	4
Component requirement	x	x				x	x				x	x	x																						17	17
None																																			2	2
<b>3.3</b>	<b>Are the national requirements based on the CE labelling of the component or system, if it exists for the component or system?</b>																																			
CE	x																																	14	14	
National, overruling CE																																			2	3
None																																			6	8
<b>3.6</b>	<b>Are there fines or similar penalties when the requirements are not met?</b>																																			
Yes																																			14	17
No	x																																		8	8
<b>3.11</b>	<b>Describe whether there is a link between renovation of buildings and your national certification scheme</b>																																			
Link																																			10	10
No link	x	x																																	12	15

The full report with more details, tables and all national comments on the answers is available on the EPBD Buildings Platform [2].

## 7 > References

1. Directive 2002/91/EC of the European Parliament and the Council of 16 December 2002 on the energy performance of buildings. Official Journal of the European Communities (4.1.2003).
2. Thomsen K.E. Wittchen K.B. Erhorn H. Erhorn-Kluttig H. Thresholds related to renovation of buildings - EPBD definitions and rules. SBi 2009:02. Danish Building Research Institute, Aalborg University, Hørsholm, Denmark (2009): [www.buildingsplatform.org/cms/index.php?id=118&publication\\_id=3308](http://www.buildingsplatform.org/cms/index.php?id=118&publication_id=3308)

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