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**Energijske lastnosti stavb - Določanje in poročanje o faktorjih primarne energije (PEF) in emisijskem koeficientu CO<sub>2</sub> - Splošna načela, Modul M1-7**

Energy performance of buildings - Determination and reporting of Primary Energy Factors (PEF) and CO<sub>2</sub> emission coefficient - General Principles, Module M1-7

Energieeffizienz von Gebäuden - Bestimmung und Berichterstattung von Primärenergiefaktoren (PEF) und CO<sub>2</sub>-Emissionsfaktoren

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**Energy performance of buildings - Determination and reporting of Primary Energy Factors (PEF) and CO<sub>2</sub> emission coefficient - General Principles, Module M1-7**

Energieeffizienz von Gebäuden - Bestimmung und Berichterstattung von Primärenergiefaktoren (PEF) und CO<sub>2</sub>-Emissionsfaktoren

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 371.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## European foreword

This document (prEN 17423:2019) has been prepared by Technical Committee CEN/TC 371 “Energy Performance of Buildings project group”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

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## Introduction

This document is part of a series of standards aiming at international harmonization of the methodology for the assessment of the energy performance of buildings (EPB standards).

This document specifies the choices to be made to calculate the PEF(s) and CO<sub>2</sub> emission coefficients related to different energy carriers.

The document can be adapted to different time steps (annual, monthly, hourly) with the scenarios used for energy use and energy delivered.

For the correct use of this document, a normative template is given in Annex A to specify choices.

The target group of this document are all the users of the set of EPB standards and especially national standardization experts or building authorities who are in charge of defining the PEFs and CO<sub>2</sub> Emission coefficients.

This document is a new standard.

*Information for the public enquiry – to be deleted for the final publication:*

In this document, explicative elements of a technical report and requirements related to a standard are merged for a better understanding of this document.

It has not been decided yet if a separate technical report will be drafted. This will also depend on feedback from the public enquiry.

Choices related to PEF and CO<sub>2</sub> are also dealt with in other documents (e.g: EN ISO 52000-1, EN 15316-4.5). In the future, all choices are expected to be summarized in one document. Therefore, chapters of other documents have been copied into this document to make a consistent document and provide a better understanding.

Annex A (normative) provides a template to report only the main methodological choices that have an impact on PEF and CO<sub>2</sub> emission coefficient values. No mandatory quantitative reporting of data are requested. These choices are described in Clause 6.

Informative general formulae defining the PEF for different configurations (e.g. one main energy carrier, multi energy input systems, multi energy output systems, exchanges with other perimeters) have been added at the end of the extension period. These general formulae do not have an impact on PEF and CO<sub>2</sub> emission factors but contribute to a better understanding. Related informative data reporting tables show a possible structure of resumed data reporting towards are more common structured quantitative reporting.

It has not been decided yet to make the formulae and reporting tables normative.

## 1 Scope

This document provides a transparent framework for reporting on the choices related to the procedure to determine PEFs and CO<sub>2</sub> Emission coefficients for energy delivered to and/or exported by the buildings as described in EN ISO 52000-1:2017. Exported PEFs and CO<sub>2</sub> Emission coefficients can be different from those chosen for delivered energy.

This document can be considered as a supporting/complementing standard to EN ISO 52000-1, as the latter requires values for the PEFs and GHG Emissions factors to complete the EPB calculation.

Table 1 shows the relative position of this document within the set of EPB standards in the context of the modular structure as set out in EN ISO 52000-1.

**Table 1 — Position of this standard (M1–7), within the modular structure of the set of EPB standards**

	Overarching	Building (as such)	Technical Building Systems											
Submodule	Descriptions		Descriptions		Descriptions	Heating	Cooling	Ventilation	Humidification	Dehumidification	Domestic Hot water	Lighting	Building automation and control	PV, wind, ..
sub1		M1		M2		M3	M4	M5	M6	M7	M8	M9	M10	M11
1	General		General		General									
2	Common terms and definitions; symbols, units and subscripts		Building Energy Needs		Needs								a	
3	Applications		(Free) Indoor Conditions without Systems		Maximum Load and Power									
4	Ways to Express Energy Performance		Ways to Express Energy Performance		Ways to Express Energy Performance									
5	Building categories and Building Boundaries		Heat Transfer by Transmission		Emission and control									
6	Building Occupancy and Operating Conditions		Heat Transfer by Infiltration and Ventilation		Distribution and control									
7	Aggregation of Energy Services and	X	Internal Heat Gains		Storage and control									

	Overarching	Building (as such)	Technical Building Systems										
Submodule	Descriptions	Descriptions	Descriptions	Heating	Cooling	Ventilation	Humidifi- cation	Dehumidification	Domestic Hot water	Lighting	Building automation and control	PV, wind, ..	
sub1		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	
	Energy Carriers												
8	Building zoning	Solar Heat Gains	Generation and control										
9	Calculated Energy Performance	Building Dynamics (thermal mass)	Load dispatching and operating conditions										
10	Measured Energy Performance	Measured Energy Performance	Measured Energy Performance										
11	Inspection	Inspection	Inspection										
12	Ways to Express Indoor Comfort		BMS										
13	External Environment Conditions												
14	Economic Calculation												

<sup>a</sup> The shaded modules are not applicable

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15316-4-5:2017, *Energy performance of buildings — Method for calculation of system energy requirements and system efficiencies — Part 4-5: District heating and cooling, Module M3-8-5, M4-8-5, M8-8-5, M11-8-5*

EN ISO 7345, *Thermal performance of buildings and building components – Physical quantities and definitions (ISO 7345)*

EN ISO 52000-1:2017, *Energy performance of buildings — Overarching EPB assessment – Part 1: General framework and procedures (ISO 52000-1:2017)*



### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 7345, in EN ISO 52000-1, and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1

##### **EPB standard**

standard that complies with the requirements given in EN ISO 52000-1, CEN/TS 16628 and CEN/TS 16629

Note 1 to entry: These three basic EPB documents were developed under a mandate given to CEN by the European Commission and the European Free Trade Association (Mandate M/480), and support essential requirements of EU Directive 2010/31/EU on the energy performance of buildings (EPBD). Several EPB standards and related documents are developed or revised under the same mandate.

[SOURCE: EN ISO 52000-1:2017 (3.5.14)]

#### 3.2

##### **primary energy**

energy that has not been subjected to any conversion or transformation process

Note 1 to entry: Primary energy includes non-renewable energy and renewable energy. If both are taken into account, it is called total primary energy.

[SOURCE: EN ISO 52000-1:2017 (3.4.29)]

#### 3.3

##### **energy carrier**

substance or phenomenon that can be used to produce mechanical work, electricity or thermal energy or to operate chemical or physical processes

[SOURCE: EN ISO 52000-1:2017 (3.4.9), modified – 'or heat' has been replaced by 'electricity or thermal energy'.]

#### 3.4

##### **primary energy factor**

##### **PEF**

ratio of the primary energy to the energy delivered to or exported from the assessment boundary

Note 1 to entry: PEF can refer to the total primary energy or only to the renewable and/or non-renewable primary energy. To be more precise it should be specified (e.g. PEF<sub>nren</sub>).

Note 2 to entry: PEFs can differ by year

Note 3 to entry: The term “building” in this document is used to mean “whatever is inside the assessment boundary”.

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## 3.4.1

**non-renewable primary energy factor for delivered energy carrier**

non-renewable primary energy for a given energy carrier, including the delivered energy and the considered non-renewable energy overheads of delivery to the points of use, divided by the delivered energy

[SOURCE: EN ISO 52000-1:2017 (3.5.17)]

## 3.4.2

**non-renewable primary energy factor for exported energy carrier**

non-renewable primary energy for a given energy carrier, including the exported energy and the considered non-renewable energy overheads of producing and exporting to the collection points, divided by the exported energy

## 3.4.3

**renewable primary energy factor for delivered energy carrier**

renewable primary energy for a given energy carrier, including the delivered energy and the considered energy overheads of delivery to the points of use, divided by the delivered energy

[SOURCE: EN ISO 52000-1:2017 (3.5.21), modified – For an energy carrier the words 'distant or nearby' have been deleted.]

## 3.4.4

**renewable primary energy factor for exported energy carrier**

renewable primary energy for a given energy carrier including the exported energy and the considered renewable energy overheads of producing and exporting to the collection points, divided by the exported energy

## 3.4.5

**total primary energy factor**

sum of non-renewable and renewable PEFs for a given energy carrier

[SOURCE: EN ISO 52000-1:2017 (3.5.25)]

## 3.5

**CO<sub>2</sub> emission coefficient**

coefficient that describes the amount of CO<sub>2</sub> that is released from doing a certain activity, such as burning one tonne of fuel in a furnace

Note 1 to entry: CO<sub>2</sub> emission coefficients can differ by year.

Note 2 to entry: The CO<sub>2</sub> emission coefficient can also include the equivalent emissions of other greenhouse gases (e.g. methane). To be more precise it should be specified by adding “equivalent” (e.g. CO<sub>2</sub> eq).

[SOURCE: EN ISO 52000-1:2017 (3.5.4), modified – The original note 1 has been deleted. In note 3 the second sentence has been added.]

## 3.6

**assessment boundary**

boundary where the delivered and exported energy carriers are measured or calculated

[SOURCE: EN ISO 52000-1:2017 (3.4.2), modified – 'energy' has been replaced by 'energy carriers'.]

**3.7****energy flow**

flow of energy by means of carriers in the direction from the energy source to the energy use

**3.8****greenhouse gas****GHG**

gaseous constituent of the atmosphere, both natural and anthropogenic, that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the earth's surface, the atmosphere, and clouds

[SOURCE: EN ISO 14067:2018 (3.1.2.1), modified – The notes have been deleted, because they are not of interest for the application of the term here.]

**3.9****biogenic carbon**

carbon derived from biomass

[SOURCE: EN ISO 14067:2018 (3.1.7.2)]

**3.10****fossil carbon**

carbon that is contained in fossilized material

Note 1 to entry: Examples of fossilized material are coal, oil and natural gas and peat.[SOURCE: EN ISO 14067:2018 (3.1.7.3)]

**4 Symbols, subscripts and abbreviations****4.1 Symbols**

<https://standards.iteh.ai/catalog/standards/sist/028904e4-a9ec-4850-a5ae-6ac5b3d7f5/sist-en-17423-2021>  
[SOURCE: EN ISO 52000-1:2017]

For the purposes of this standard, the symbols listed in Table 2 apply.

The following text includes symbols that are not used in this document, but that are needed for overall consistency in the EPB set of standards.

**Table 2 — Symbols and units**

Symbol	Quantity	Unit
$c$	coefficient	various <sup>a</sup>
$E$	energy in general <sup>b</sup>	kW·h
$E_{cr}$	energy carrier	kg, m <sup>3</sup> , A, KW h <sup>c</sup>
$f$	factor (e.g. primary energy factor, ...)	– <sup>a</sup>
$H$	calorific value	kW·h/kg
$K$	CO <sub>2</sub> emission coefficient	kg/(kW·h)
$m$	mass (e.g. quantity of CO <sub>2</sub> emissions)	kg
$N$	number of items (integer only)	–
$Q$	quantity of heat	(kW·h)
$t$	time, period of time	s <sup>d</sup>

Symbol	Quantity	Unit
$W$	(electrical) auxiliary energy	(kW·h)
$X$	volume fraction	%
$X, Y$	any property, system, ...	–
$\eta$	efficiency (factor)	– a
<sup>a</sup> Coefficients have dimensions; factors are dimensionless. <sup>b</sup> Including primary energy; note that for heat the symbol $Q$ and for auxiliary energy and work the symbol $W$ is used. <sup>c</sup> The unit depends on the type of energy carrier. <sup>d</sup> Hours (h) are used as the unit of time instead of seconds when aggregating heat or energy flow ( $E$ ) to quantity of heat or energy (kW·h).		

## 4.2 Subscripts

[SOURCE: EN ISO 52000-1:2017]

For the purposes of this International Standard, the subscripts listed in Table 3 apply.

The following text includes subscripts that are not used in this document, but that are needed for overall consistency in the EPB set of standards.

**Table 3 — Subscripts**

Subscript	Term	Subscript	Term
an	annual	lat	latent
aux	auxiliary	lf	liquid fuel
avg	time-average	ls	losses
B	building	mt	monthly
bm	biomass	max	maximum
C	cooling	nren	non-renewable
CO <sub>2</sub>	CO <sub>2</sub> emission	ntdel	net delivered
cr	energy carrier	oil	oil
CW	cooling and DHW	out	output, outlet
day	daily	P	primary energy
dc	district cooling	per	for a period of time
del	delivered	Pnren	non-renewable primary energy
dh	district heat	pr	produced
dis	distribution	Ptot	total primary energy
distant	distant	pv	solar electricity (photovoltaic)
dhum	dehumidification (system)	ren	renewable energy
e	external	seas	seasonal
el	electricity	sf	solid fuel